THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—13TH YEAR. SYDNEY: SATURDAY, MAY 29, 1926. No. 22.

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THE CAUSES AND PREVENTION OF MATERNAL MORBIDITY AND MORTALITY.[1]

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PART I.

Introduction.

A TRAGEDY of paramount importance exists in the fact that annually in every country and in every quarter of the hemisphere very many women lay down their lives in the act of child-birth or if not in child-birth because of some condition due to pregnancy.

Of those who do not make the supreme sacrifice, very many suffer from the continued misery of ill health; their lives are a very burden to them. This state of affairs has existed universally for longer than a quarter of a century and even when one looks back to the first application of Lister's discovery in 1875, one sees very little improvement.

When one reflects on the vast advances made in medicine, surgery and pathology and in particular preventive medicine during the last twenty years, one is unable at first sight to comprehend the reason for this disastrous state of affairs and this apparent lack of advance made in the science and art of obstetrics.

Although puerperal infection is the cause of nearly half the deaths, it is not the sole factor in this dreadful mortality.

It is now time that the whole question be reviewed critically and constructively and from every point of bearing. The limelight must be centred not only on the medical attendant and nurse, but also on their qualifications and their training; not only on the mother, but on the general public's education and common sense. And since this appeal may be overlooked or even ignored by some of ourselves and many of the public, the position should be secured by our representatives both in Parliament and in University and legislation passed, facilities provided and any necessary changes made suitable to the magnitude of the situation.

After the World War of 1914-1918 population was a vital question to the contesting European nations. The British Empire and Australia particularly must approach the problem of population in a spirited and thorough manner. Every year the

[1] Being an essay judged by the Melbourne Permanent Committee for Post-Graduate Work to be worthy of the second place in the prize essay competition. The essay has been submitted as a thesis for the degree of doctor of medicine at the University of Melbourne.

Commonwealth Government spends much money on the encouragement of immigration.

Both infantile mortality and maternal mortality are two calamities in close ally and although some few years ago great attention was paid to and much propaganda issued in an attempt to save the babies, yet the causes and prevention of maternal mortality were not investigated or made known to the general public with the same ardour. For the last two years this question has occupied the leading minds of politicians and of medical men both throughout the British Empire and in America. In England at the annual meeting of the British Medical Association in July, 1924, a special discussion took place on this subject. In Scotland in 1924 the valedictory address of the President of the Edinburgh Obstetrical Society was centred round this problem. Again in Edinburgh in 1924 the presidential address of the same society was also concerned with the same problems. In America, where for many years the statistics of maternal mortality have been shown to be higher than for those of all other nations presenting statistics, there has arisen a committee of maternal welfare of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons. The *American Journal of Obstetrics and Gynecology* has now created in its issue a department of maternal welfare to mark the importance of a broader outlook on obstetrics. This important and representative journal is fully aware of the fact that even in America maternal morbidity and mortality from child bearing are undoubtedly high and also that there is a very deplorable loss of fœtal life.

From the foregoing statements one naturally asks oneself on a little more reflection: "Can the state of pregnancy and the act of parturition be normal and physiological?"

The answer is not easily given. More than a hundred years ago Mauriceau epigrammatically proclaimed that women only escaped being sick once a month by having a sickness which lasts nine months.

Moran in 1915 appealed for a nation-wide propaganda to teach the laity that the long cherished fallacy that pregnancy and labour are physiological conditions should be abandoned.

J. Whitridge Williams in 1923 said that 50% of all pregnant women show some effect of toxæmia which he classifies as physiological.

In spite of these quotations and in the present light of our knowledge the answer to the above vital questions may be thus announced: Pregnancy and labour should be both normal and physiological and are so in the greater proportion of cases, but in a very large number are not.

We now see that these humane problems which have already occupied the foremost minds and brains of the world with so little result, must be taken up in a wider sense and must be approached from many aspects, each point of approach acting in coordination with each and every other.

In this the medical profession itself must be the guiding factor. Generally speaking there is a universal maternal mortality of from three to six per 1,000 births more or less constant for the last half of a century. Yet to quote a publication of the Ministry of Health, Great Britain: "The general death rate has been reduced by one-third, the infant mortality rate has been halved since the beginning of the century, yet the maternal mortality rate is little lower than it was twenty years ago."

Though this statement is in a general way fully justified by the statistics available, yet it should not be taken too literally. There can be no doubt that there has been amongst individual practitioners and in all of our maternity hospitals an absolute reduction in maternal mortality. In the case of maternal morbidity which will later be defined, there does not appear to be much, if any, decrease in its incidence. The out-patient department is crowded with patients awaiting admission for operation for gynæcological conditions due to puerperal morbidity. Yet in spite of these pessimistic quotations great advances have been made in obstetrics in the last quarter of a century. Development has been chiefly in three directions: (i.) in the perfecting of the technique of the various obstetric operations and in a much clearer interpretation of their indications and limitations; (ii.) in the universal recognition of the all importance of antenatal supervision and examination; (iii.) on theoretical questions concerning antenatal pathology and the biochemistry of the urine and blood in the toxæmias of pregnancy.

One has now reached a stage when one must review the following weaknesses in the chain of knowledge: (i.) the training of the medical student; (ii.) the training of nurses and midwives; (iii.) improved post-graduate training; (iv.) the provision of antenatal clinics and maternity centres on an organized basis throughout the Commonwealth; (v.) the general supervision and notification of maternal mortality; (vi.) the education and cooperation of the public.

Before these problems are dealt with, the definition of maternal mortality and morbidity and the causes of each must be discussed in considerable detail.

Many of the statements to be made are but extracts from textbooks, quoted statements and duplications of reports and they may appear to be of little value at first sight. But they are statements of fact known and believed by most of us and it is only by repetition and duplication that they may be sufficiently impressed on all minds.

To quote Professor B. P. Watson:

> Things we have done in the past we are inclined to continue to do out of mere habit or because of a certain natural laziness which makes the effort of change seem too great. Tradition has its drawbacks as well as its advantages. Conservatism is to be commended when it makes us hold on to things which are of approved value, but it must be condemned if it renders us incapable of appreciating and making full use of the newer ideas which emerge with time.

PART II.

Maternal Mortality and Morbidity.

Maternal mortality, according to the international list of causes of death (abridged), is to

indicate all deaths due to child-birth and to all diseases caused by pregnancy and confinement. This is further divided into two groups.

Group 1.—Puerperal septicæmia, puerperal fever, peritonitis.

Group 2.—Accidents of pregnancy, miscarriage, severe hæmorrhage during pregnancy, uncontrollable vomiting; puerperal hæmorrhage, *post partum* hæmorrhage, *placenta prævia*, toxæmic hæmorrhage: other accidents of labour, cases of difficult labour, operative delivery, rupture of the uterus, other complications except hæmorrhage occurring at the time of labour; puerperal albuminuria and convulsions; *phlegmasia alba dolens*, embolus, sudden death following child-birth (not otherwise defined), for example, insanity following pregnancy or labour; puerperal diseases of the breast, inflammation or infection during lactation.

In summarizing these causes for the purposes of discussion I shall refer to Whitridge Williams who approaches the causes of maternal morbidity from four sides: (i.) infection, (ii.) toxæmia, (iii.) hæmorrhage, (iv.) dystocia.

Although the above are the obstetric conditions officially described as the causes of death, there are other contributing causes which De Lee has summarized in another manner. His summary is as follows:

1. Lack of prenatal care.
2. Lack of aseptic practice and conscience in a large number of physicians.
3. Too much interference of the normal labour processes by men who do not know how.
4. Unnecessary Cæsarean section, especially universally performed Cæsarean section.
5. Undue exaltation of the child's life over that of the mother.
6. The rapid growth of maternity wards in general hospitals, indeed the general mixing of maternity cases with surgical and medical cases has contributed enormously to the spread of puerperal infection.

In addition to these the American Committee on Maternal Welfare adds:

7. Indiscreet and indiscriminate use of "Pituitrin" regardless of indication. These will be dealt with in due course.

Maternal Morbidity.

Morbidity is a word coined, as it were, to express the fact that in the reproductive process very many women are sickened or injured. De Lee states that he has never seen a woman as anatomically perfect after delivery as she was before pregnancy occurred. Maternal morbidity is, therefore, not easily definable, but may be applied in two senses: firstly, a general sense and secondly, a restricted sense.

The former deals with all abnormalities occurring either immediately or at some remote period following labour, whilst the latter is applicable to those abnormal conditions immediately following labour. In a general sense morbidity includes all diseases or conditions due to trauma, infection or toxæmia that may befall a pregnant, parturient or puerperal woman. Under this heading may be grouped: (i.) Overdistension of the abdomen, weakness of the abdominal wall, visceroptosis; (ii.) tearing, stretching and bruising of the urogenital septum, prolapse of urethra and anterior vaginal wall, vesico-vaginal fistulæ, relaxed vaginal outlet, cervical lacerations; (iii.) laceration and overstretching of the pelvic floor, displacements of the uterus, prolapse of the uterus, lacerations of perineum; (iv.) trauma, due to operative deliveries, lacerations of the perineum, weakened abdominal wall following Cæsarean section, extensive cervical lacerations, weakened uterine scar following Cæsarean sections; (v.) infections, infections of the uterus and adnexæ, cervical erosion, cystitis, pyelitis, inflammatory diseases of the breast; (vi.) toxæmias, diseases of the liver and kidneys.

Thus will be seen that a whole host of maladies and ailments may arise as the result of the reproductive process; indeed, the immense amount of invalidism resulting from child-birth is absolutely unmeasurable.

Morbidity, however, has a narrower and restricted sense when applied to the puerperium and infection.

The British Medical Association at Leicester in 1905 standardized a method of calculating puerperal morbidity:

> The puerperal morbidity should include all fatal cases and also all cases in which the temperature exceeds 100° F. on any two of the bi-daily readings from the end of the first to the eighth day after delivery.

This is obviously only an estimate of the immediate morbidity due to infectious processes and the general and remote morbidity is excluded. Also it will be clear that many of the processes causing the morbidity so calculated will be extragenital in origin.

The magnitude of the number of causes of morbidity strikingly impresses one as to the rationale for the high morbidity existing today. Naturally no statistics can be compiled to show the frequency with which any of these conditions occur, but a visit to the outdoor gynæcological department of any hospital will quickly convince anyone as to the amount of suffering of so many women following child-birth.

The frequency of morbidity resulting from infective processes may be gauged from the striking denunciation of De Lee, who says: "It is safe to say that for every woman who dies from puerperal infection, five others suffer from it, but it is impossible to prove this statement."

De Lee also says: "It kills one in four hundred women delivered of full term children; it leaves as incurable invalids at least ten times this number."

Another estimate of the great prevalence of morbidity may be formed by the frequency with which one meets the condition of "one-child sterility." Indeed in many of these cases it is even extremely difficult to be sure that pyrexia occurred during the lying-in period and no note can be found of any infectious process.

Notwithstanding this pessimistic estimate, with proper care, supervision and management most of these diseases and accidents can be prevented and no department of preventive medicine offers a wider scope with the promise of such excellent results. In other words, good obstetrics constitutes preventive gynæcology, a fact not fully appreciated and even ignored by so very many.

To quote Tweedy and Wrench: "We measure our success by the number of morbid patients we get."

The mortality statistics do not form a good criterion of the incidence of morbidity.

In dealing with the advantages of confinement in hospital in comparison with the home, Eno claims the morbidity in the former to be 2% in comparison to 8% in the latter. He also states it to be four times as great in *primiparæ* as in *multiparæ*. It is also greatly increased by long labour and repeated vaginal examinations. Other contributing causes may be enumerated:

1. Interference by intrauterine douche.
2. Delivery by version and extraction.
3. Craniotomy.
4. Manual delivery of the placenta.
5. Cæsarean section.
6. High forceps and mid-forceps.
7. Bag induction.

In dealing more fully with the ætiology of morbidity one has seen that it is due to three broad classifications, namely, infection, traumatism, toxæmia.

Indeed, its causes are fully understood, the contributing causes are realized and yet in spite of this it persists.

As in the case of maternal mortality this does not represent altogether the conditions existing today in large maternity hospitals and in the practice of individual obstetricians. For instance, the incidence of cases of vesico-vaginal fistulæ, so very frequent amongst out-patients a very few years ago, is now reduced to a rarity and also the complete tear of the perineum is but seldom seen.

Incidence of Maternal Mortality.

Death resulting from conditions associated with pregnancy and child-birth occurs throughout the universe. The statistics dealing with maternal mortality amongst the civilized nations are both interesting and of very great value.

At present, generally speaking, there is an estimated mortality varying from three to six per thousand live births; that is to say, for every two hundred children born one mother dies.

Thus thousands of women die annually throughout the world from causes consequential to the state of pregnancy.

For instance in the United States of America in 1916, where only two-thirds of the total population were covered, over 11,500 women died and De Lee commenting on this says: "I feel perfectly safe in stating that over 20,000 women die in the United States of America every year from direct and indirect effects of labour."

In 1919 there were 17,800 deaths registered and of these 7,000 were due to puerperal infection.

In an analysis of the causes producing this mortality, it will be found that puerperal septicæmia or sepsis is responsible for very nearly half of the deaths. The proportion is clearly shown in the graphs (see Appendix).

In Australia, for instance, the proportion of the total death rate due to infection is most constant and is about 33%. In reality, however, the proportion is almost certainly much greater, as no doubt other deaths have occurred and have been notified as due to other causes, either owing to faulty diagnosis or else deliberate concealment.

However, each year the number reported is increasing, because diagnosis is more accurate and the conditions of the statistics have been improved. The latter only applies to the United States of America where the areas of registration are enlarging. In addition to these many more die months or even years later following operations undertaken to cure either the injuries or the infection resulting from a previous confinement.

The statistics shown in the appended graphs are compiled from various sources, but mostly from the exhaustive paper of Grace Meigs in 1917 on "Maternal Mortality from all Conditions Connected with Child Birth in the United States of America and Certain Other Countries."

Meigs in her report further stated that during the period 1910 to 1917 while there was no reduction in the maternal mortality, yet the typhoid rate was reduced by two-thirds, the tuberculosis rate was definitely reduced and the diphtheria rate was reduced by more than one-half.

Dublin in 1918 estimated that infection was responsible for 43% of all deaths incidental to child-birth in the United States of America and Howard in 1921 calculated: "that one out of every 406 women who become pregnant, dies from infection."

It is further evident that the statistics can be divided into those representing two periods, firstly, those relating to the mortality occurring before 1870 and secondly, those relating to the mortality since, the latter being influenced by the advent of Listerism following Lord Lister's discovery in 1867. Lister's methods, however, were not universally applied till 1875. Since then the mortality from puerperal infection in hospital practice has very materially diminished, whilst the same degree of improvement in private practice has not been evident.

For instance during the early years 1828-1849 in the Maternité of Paris and in the Vienna Lying-in Hospital puerperal infection was responsible for from 10% to 15% of deaths; whereas Pinard in 1909 reported a mortality from puerperal infection of 0·15% in 45,633 deliveries. Von Herff and Ahlfeld (quoted by Lea) report series of six thousand cases and eight thousand cases with no deaths and one death respectively from infection. Boxall, quoting the York Road Lying-in Hospital, mentions a series of 8,373 deliveries without death

from infection and the Chicago Lying-in Hospital and Queen Charlotte's Hospital, London, record wonderful series from the externe service.

Williams in 1913 even stated: "At the present time it is safe to say that in well regulated hospitals, mortality from puerperal infection is less than 0·25%."

The statistics of the Rotunda Hospital, Dublin, are of special interest. Tweedy, quoting from the old hospital records, mentions that between 1766 and 1780 the hospital possessed no water supply, all water being brought from a pump which was situated next to the hospital cesspool. The patients had beds of straw and two patients with their babies occupied each bed. Yet in 1766 amongst six hundred and eleven deliveries there were only three deaths and in 1780 in nine hundred and nineteen deliveries there were only five deaths.

The following is the death rate per thousand births over different periods:

1828-1849	13·4
1825-1875	18·7
1868-1875	20·8
1903-1910	3·3
1919-1923	5·2

The mortality rate during the period 1919-1923 includes both the interne and externe, the latter for this period being only four per thousand.

The morbidity during the early years must have been far greater than at present, for in 1878, when the clinical thermometer was first introduced into the hospital, the morbidity was about 50% and the condition of the hospital was referred to as "particularly healthy."

The morbidity of recent years in the hospital, estimated by the British Medical Association standard, is as follows:

1904-1910	6·16%
1919-1923	6·5%

Some other mortality statistics are also of interest, thus:

	Per Thousand Live Births.
Queensland—	
1871-1873	3·83
1921-1923	4·8
New Zealand—	
1872	4·26
1875	6·44
1922	5·1

These figures show an existing state of affairs certainly worse than pertained fifty years ago and on looking at the figures of England and Wales as far back as 1838 it is still no better.

It is also evident that as such improvement is now shown in the hospital statistics, the sad statement must be made that those conducting private practice are to blame. The externe services of various hospitals fully indicate how much aseptic practice and technique can do, even in the unfavourable and unhygienic surroundings which exist in those services. Although puerperal infection today is very rarely epidemic in its form, yet it is universally prevalent and perpetually endemic. It occurs least frequently in the special maternity hospital and according to De Lee is more frequent in the obstetric department of a general hospital than in private practice.

The statistics of maternal mortality on being further analysed are found to be almost equal for both urban and rural localities, but when the statistics of deaths due to puerperal infection are taken, they are found to be worse in the urban group. For instance, Howard in the United States of America found the incidence of infection to be one-fifth higher among the urban than among the rural population. The very slight difference in total mortality is explained by the increased rural mortality due to dystocia, toxæmia and in general the absence of prenatal supervision. Eden in 1922 also showed that while the proportion of deaths from these latter causes had decreased, yet that due to infection had actually increased. And further must be considered those deaths, however distant, which occur owing to general diseases originating from a puerperal process or to operations to relieve the effects of a puerperal infection. Thus two deductions necessarily follow:

1. The methods and technique of lying-in hospitals can be and must be generally adapted to all forms of private practice.

2. Prenatal care must extend to all localities and to all classes.

PART III.

Puerperal Infection.

Since puerperal infection is responsible for more than 30% of all maternal deaths, its causes and prevention must be fully dealt with.

The history of puerperal infection is one of extreme interest. Puerperal fever was the term introduced by Morton in 1692 to apply to an acute febrile disease which seized lying-in women and exhibited a high degree of fatality.

Puerperal fever existed even among the most primitive savages untouched by civilization. It was known to Hippocrates, 400 B.C., who described cases accurately and in detail, as it is known today. He also mentions its epidemic tendency. It is also described by Celsus and Galen and there are numerous historic references to it throughout the Middle Ages. In an epidemic form it is first authentically reported by Hervieux and said to have occurred in Leipzig during 1652-1655. Mauriceau describes an epidemic of puerperal fever which occurred in the city of Paris and in the first lying-in ward in l'Hôtel Dieu in 1660 and in this epidemic 66% of the women delivered died of it.

In 1831 at the Paris Maternité the mortality was still 9%; in 1750 and 1761 there were epidemics in London and in 1772 in Edinburgh. In Vienna in 1842, where the *post mortem* room was visited by medical students, the disease became very prevalent. Up to this time the exact nature of the disease was unknown.

In 1843 Oliver Wendel Holmes recognized "the contagiousness of puerperal fever" and even suggested rules of prophylaxis. In 1847 Semmelweiss, of Vienna, announced his famous theory as to the cause of puerperal fever and with the discovery of

the germ theory of disease by Pasteur in 1863 and the application of it in the use of antiseptics by Lord Lister in 1867 the true nature and reason for puerperal infection was established.

Although the history of its discovery is of great interest, yet the mortality statistics are of still greater interest at the present time.

Before proceeding it will be necessary to define "puerperal infection."

De Lee defines it as follows:

> Puerperal fever or puerperal infection is a general term embracing all the conditions, usually of a febrile nature, but sometimes non-febrile, affecting puerpera, originating from infection of the genital tract at any point of its extent.

Whitridge Williams gives a general meaning to puerperal infection, namely:

> All the various morbid conditions which result from the entrance of infective microorganisms into the female generative tract during labour or the puerperium.

Having traced the brief history of this condition which leads to the universal acknowledgement that puerperal infection is surgical wound infection and is due to the invasion of the generative tract by various pyogenic bacteria, it will now be necessary to outline the bacteriology and pathology of the condition. De Lee, quoting from Walthard, Schottmüller and others, mentions the following organisms as positive and probable causes:

Streptococcus pyogenes, Streptococcus viridans, Diplostreptococcus puerperalis, Streptococcus anaerobius putridus, Diplococcus lanceolatus pneumoniæ, Staphylococcus aureus et albus, Anaerobic staphylococcus, *Bacillus coli communis,* gonococcus of Neisser, *Bacillus pneumoniæ* of Friedländer, *Bacillus pyocyaneus, Bacillus proteus, Bacillus aerogenes capsulatus, Bacillus fusiformis* and spirilla (hospital gangrene), *Bacillus typhosus, Bacillus tetani, Bacillus anthracis, Bacillus diphtheriæ, Bacillus influenzæ.*

In addition there is a host of other bacteria of putrefaction and decomposition. Many of these bacteria, both parasitic and putrefactive, present many morphological variations and also cultural differences. Rarely is one of this number the sole cause of the disease and the existence of two or more living in symbiosis appears to aggravate the virulence of one or the other.

The following description of the bacteriology is the latest information available in this respect.

1. Streptococcus was discovered in 1865 by Mayrhofer and was first cultivated in 1880 by Pasteur from a patient with puerperal infection. This was confirmed by Bumm, Döderlein, Winter, Widal and others and is now believed to be the usual cause of the epidemic and fatal forms. Schottmüller in 1903 demonstrated the hæmolytic forms, which are almost always highly virulent, but it must not be lost sight of that the non-hæmolytic variety is occasionally very pathogenic. Lea and Sidebotham showed that even the hæmolytic form is not always virulent. It is quite possible that the hæmolytic function may be lost either when the coccus is living in symbiosis or else may be varied by cultural methods. Schottmüller in 1910 also demonstrated the importance of a streptococcus of the anaerobic type. Foulerton and Bonney found the streptococcus in 60% of patients in whom the uterine cavity was infected.

2. Staphylococcus was demonstrated in 1888 by Brieger and in 1894 by Doleris. *Staphylococcus aureus* is the variety usually observed in these cases and may sometimes occur also in anaerobic form. *Staphylococcus aureus* may be the only organism concerned, but is sometimes found mixed with the streptococcus or colon bacillus.

3. Gonococcus was first proved to cause puerperal infection by Krönig in 1893, although it was suspected long before as an important productive factor. Williams has found this organism in approximately 9% of his febrile patients, although Krönig cultivated it in 50 out of 179 similar cases. Stone and McDonald ascribe one-sixth to one-tenth of all puerperal fever attacks to this organism. Many others have confirmed the frequency of this infecting agent and the only recent writers not experiencing similar conditions are Foulerton and Bonney. This is of importance in view of their paper on autogenous infection. Puerperal gonococcal infections usually follow a favourable course, but fatal septicæmia may occasionally result.

4. Colon bacillus was first cultivated from a patient with puerperal infection by von Franque (quoted by Williams in 1893) and is now recorded as the infecting organism in a long series of cases, which is only to be expected when one recalls the relationship of the genital tract to the rectum. These organisms have been demonstrated by Gebhard in cases of *tympania utero.* Pure colon infections are usually benign in character, but have been shown to cause fatal septicæmia on occasions. When existing in symbiosis with a streptococcus the virulence of both is much augmented.

5. *Bacillus diphtheriæ* has been cultivated by many observers, including Williams, from the mucous membrane of the vagina, the infection responding to the injections of antidiphtheritic serum. One observer has recently (1920) found this bacillus frequently in the vaginal secretion of two hundred apparently healthy women. It must be remembered, however, that a very large number of cases clinically diphtheritic in type are really streptococcal and not in any way connected with true diphtheria.

6. *Bacillus aerogenes capsulatus* of Welch is occasionally concerned in puerperal infection, especially following criminal abortion. Williams mentions a case reported by Dobbin in 1896 in which the characteristics of this gas-forming organism were fully present and following this many have confirmed infection with this organism, namely Welch in 1900 and Heynemann in 1911. In all probability the organism is identical with Pasteur's *vibrion septique.* The bacillus may occur alone, but more often is associated with others, particularly the streptococcus when the prognosis is very unfavourable. It is important to remember,

as was pointed out by Welch and Dobbin, that women supposed to have died from air embolism, may really have died from infection with this organism.

7. *Bacillus typhosus* demonstrated in 1898 in a patient who recovered by Williams and Dobbin, who believed that the organism was introduced by the midwife. The presence of these bacilli in the lochia should not be regarded as evidence of puerperal infection, but rather of typhoid septicæmia.

8. Pneumococcus.—Hornung in 1920 collected the facts, stating that this organism may in rare cases be found in the vaginal secretion of apparently healthy pregnant women and may cause infection when peritonitis is particularly liable to result. It must be pointed out that the presence of this organism in the lochia may result from an extragenital focus. More occasionally the pneumobacillus may be isolated.

9. *Bacillus pyocyaneus* has been recorded as an infective agent by several observers.

10. Various infections with fatal termination are due to unidentified bacilli.

11. In sapræmia the symptoms of infection are not due to organisms which make their way into the blood stream, but are due to absorption of toxins from bacteria with a saprophytic existence. The term sapræmia was first applied to this condition by Matthews Duncan. It is important to remember that this term is subject to great abuse, as it has been made to include cases of true infective origin. The causative organisms are usually anaerobic, produce gas and cause putrefaction. Besides the organisms already mentioned there can be no doubt that as laboratory methods for culture improve, other organisms will be added to this list or if not other organisms different morphological varieties of the organisms already referred to.

Having considered the bacteriology, it is now necessary that the source of these bacteria must be decided on and also how they gain admission to the genital tract, thus indicating the lines on which to base preventive treatment. It has already been stated that the bacteria concerned are identical with those causing ordinary wound infection. Semmelweiss distinguished two modes of inoculation, namely, one from without, exogenous, and one from within, autogenous or endogenous.

The question of autogenous infection is one around which at present centres the greater interest, not because it is agreed that the other mode is almost always the one concerned, but because this mode of inoculation has not been universally admitted.

With increasing knowledge of the results due to the preventive measures adopted, success came so rapidly that many declared that all cases were exogenous and that, therefore, there was always somebody to blame.

Ahlfeld, however, since 1885 had always believed in the occasional possibility of an autoinfection. Ahlfeld distinguishes three types of autoinfection: (i.) that from organisms already present in the genital tract, including the vulva, for example gonorrhœa; (ii.) that from distant foci, either by the patient's hand or by the blood stream; (iii.) that by spread of infection from local contiguous infections, for example a suppurating appendix.

De Lee, however, limits the term autoinfection to infections with organisms already present in the vulva and genital tract, which develope virulence and invade the tissues or cause toxins to be absorbed without any possible external influence. This was the idea as conceived by Semmelweiss who in describing such cases says: "In rare instances the decomposed animal-organic material which causes child-birth fever when absorbed is produced within the patient herself. These are the cases of autoinfection and cannot be prevented."

Clinically such cases do appear to occur, both in the broader sense of Ahlfeld and in the narrower application of De Lee, but they are very few in number. The proofs of this, however, are not clear.

The question for many years has occupied the minds of the foremost of obstetricians and bacteriologists. Much literature has accrued, but many conflicting reports and opinions have been announced.

The question centres around the bacteriology of the vagina. Can the vagina harbour pathogenic organisms, the woman being in perfect health? Following on this, what then constitutes the normal discharge from the vagina and what is the normal bacteriological content of this discharge?

Kaltenbach in 1889 advanced the view that pathogenic bacteria were normally present in quite a large percentage of apparently healthy pregnant women, even the streptococcus. Williams at that time believed that no pyogenic bacteria were present in the normal vagina. However, apparent proof of the possibilities of autoinfection is afforded by the rare instances of serious puerperal infection occurring in women not examined during labour, whose labours have been conducted in a thorough, aseptic manner. But the possibility of self-inoculation by the patient must not be forgotten.

In general practice, however, there are analogies of autoinfection in the acute peritonitis of virgins, the result of "catching cold" during a period and osteomyelitis in children following severe exposure (De Lee). Infection *viâ* the blood current may also occur, for example by the pneumococcus and also the streptococcus from a lesion, such as angina or influenzal pneumonia (Williams).

Winter in 1911 held, however, that autoinfection should only be assumed when bacteriological examination revealed that the organisms found in the uterus were identical with those found in the vagina before labour. As he adduced such proof, he held that true autoinfection did occur. His work is much later than that done in connexion with this subject by Foulerton and Bonney in 1905 and by Lea and Sidebotham in 1909; thus the solution of the problem depends on the demonstration of these organisms in the generative tract during the last weeks of pregnancy. This problem has been

attempted, but unfortunately, although results have been obtained, they have not been uniform.

All investigators agree that the cavity of the normal uterus is free from bacteria, both in the pregnant and non-pregnant condition. Following on this it is necessary that the bacteriological content of the puerperal uterus be elucidated.

Before 1898 the cavity of the puerperal uterus was believed to be free from bacteria and if such were found there, it constituted evidence of infection.

In that year, however, Franz stated that after the first few days of the puerperium, bacteria could frequently be found in the uterus and yet no clinical signs of infection be present. Although this was soon confirmed by many, it was believed these bacteria were merely saprophytes, yet others claimed to have found streptococci in proportions varying from 30% to 38% of the women examined.

Foulerton and Bonney, however, carried out investigations, taking very special precautions in regard to technique; they showed that the interior of the normal puerperal uterus is always sterile.

Little in 1904 in Williams's service studied the uterine lochia taken immediately after the expulsion of the placenta and on different occasions later. From these observations Williams was able to conclude that the interior of the puerperal uterus never contained streptococci, but that, on the other hand, it could not be considered as sterile, excepting immediately after delivery and that as the puerperium advanced it progressively became more and more contaminated with bacteria, chiefly saprophytic.

Therefore, the question of autoinfection now centres around the demonstration of virulent streptococci in the vaginal secretion of healthy pregnant women. Bacteriological examinations have not decided this question and have even tended to complicate it further.

Döderlein's monograph in 1892 on the vaginal secretions promised at first to simplify the conflicting results. As his conclusions have not been confirmed by subsequent workers, there has resulted an immense literature, much of which is contradictory.

In 1898 Williams reported he was unable to find streptococci in the vaginal secretion of normal pregnant women, whereas other workers reported their presence in proportions of from 4% to 100% of the patients.

Williams believed that the differences in the results were due to error in technique which did not exclude contamination. Then in 1904, Bumm and Sigwart further complicated this subject by attributing the failure to demonstrate streptococci to the culture media employed, which had been solid. These workers by using fluid media demonstrated the presence of the streptococcus.

In 1905 Foulerton and Bonney found the colon bacillus and the *Staphylococcus albus* to be present frequently, but could not isolate from the normal vaginal secretion any other organisms of greater virulence.

In 1912 Jotten demonstrated the presence of the streptococcus, which was frequently of the hæmolytic type, but he did not attach any practical significance to its presence.

In 1914 Williams again took up the problem and demonstrated streptococci in 8% of the patients in hospital and in 55% of those examined in their own homes without warning. This is of practical importance because it shows the part played in infection by personal cleanliness.

In regard to the vulva all observers are agreed that streptococci are very frequently found there in apparently normal circumstances. Williams in his last series found them in 14% and 75% of hospital patients and patients in their own homes respectively. Finally in 1924 Williams concludes that in normal healthy pregnant women: (i.) the vaginal secretion does not contain streptococci which grow on ordinary culture media; (ii.) in a varying proportion of instances, according to the personal cleanliness of the patient it does contain streptococci which grow on special media, for example glucose bouillon and (iii.) there is no evidence to show that such streptococci play any part in the production of puerperal infection.

Thus in other words bacteriological research produces evidence of certain value in favour of the theoretical possibility of autoinfection, but the occurrence of serious streptococcal infection must always be regarded as evidence of external origin.

The gonococcus, however, can exist in the vaginal secretion and thus forms an exception. It is a frequent cause of puerperal endometritis. This is not an instance of autoinfection in the true meaning of the word, but one of contact infection occurring at some earlier period.

On account of the increasing contamination of the uterine cavity with each further day of the puerperium, the immunities provided by Nature will be sufficient to prevent infection, if allowed to exert their influences undisturbed and unmolested by external agencies. Therefore, the question remains open as it did before. It appears, however, that almost every case of puerperal infection arises from heterogeneous sources and is preventible; it, therefore, behoves us to realize that autogenous infection is very rare and is unavoidable, but that when full consideration be given any case we must be prepared to admit its possibility.

Heterogeneous Infection.

All are agreed that infection from without plays by far the greatest part in the drama of inoculation and consequently is the most important origin to be considered in any such case. In view of the many avenues through which infection may be carried to the genital tract, it is of great import that each and every path be explored and barred to the ubiquitous organism.

Many years ago when typhoid fever was very prevalent, the milk was traced carefully and laboriously from its origin to the consumer in order that the point or points of contamination could be determined. This was very successfully carried

out; it now remains to adopt a similar venture of exploration in an endeavour to discover how and when the pregnant, parturient or puerperal woman is inoculated.

During the latter part of pregnancy self-inoculation by the patient's fingers cannot be overlooked especially among the lower classes. Among the same people copulation is by no means rare during the latter months or even days of pregnancy and sometimes even during labour itself and in connexion with this Liepmann in 1910 stated that bacteriological examination of the prepuce of the penis revealed streptococci in 75% of all the men examined. De Lee quotes Kisch who refers to certain midwives who ask the husband to have intercourse with the parturient to stimulate the labour pains.

Even during labour and later in the puerperium a woman's hands may be the means of bringing organisms from other foci.

The environment of the patient may have a good deal to do with the question. Lack of sunlight, of ventilation, of fresh air and of good food, as is found in slums and overcrowded tenements, not only favours the existence of pathogenic organisms, but also increases their virulence and very materially diminishes the patient's resistance. In spite of this, however, the practice of a hospital externe department is not affected in any way at all, if labour be properly conducted.

De Lee lays considerable stress on the danger of the general septic surroundings of a public general hospital, whereby infection is carried through the air by the dust and also by the people moving about within the hospital. Even now he states "the rapid growth of maternity wards in general hospitals, indeed the general mixing of maternity patients with surgical and medical cases, has contributed enormously to the spread of puerperal infection."

On the other hand Williams just as recently states that it is "doubtful whether air infection is ever the cause of the disease." Nor does he mention any such dangers as the above.

I cannot give any statistics likely to have any possible bearing on the subject, excepting those of externe departments and I am forced to conclude that, although asepsis is more difficult to maintain in these departments and labour more difficult to conduct, yet the surroundings do not appear to cause any greater incidence of infected women.

Air infection, therefore, is now regarded as most improbable. Nevertheless both in England and America today sewer gas is sometimes blamed. Speaking of air-borne infection, Williams states: "That the danger of infection from this source will be spoken of less and less frequently as medical men become better versed in aseptic technique."

The preparatory bath before delivery has been spoken of as a possible source of infection and for this reason some obstetricians order in its place a hot shower bath. It is quite certain, however, that the omission of the bath would add very materially to the number of cases of infection. A very real danger is constituted by the use of the household water closet for the patient during the first stage of labour, especially in unsewered areas. Bed pans also have been responsible for conveying infection from one patient to another. At the Rotunda Hospital all utensils used by patients are numbered, each patient having a set numbered alike.

It now seems that all sources of contact have been eliminated, except the nurse and the physician. This is undoubtedly the most usual mode of infection. The organisms are introduced during the progress of the case by the fingers, instruments or swabs which come into contact with the genitalia.

Semmelweiss himself possessed a very accurate conception of contact infection when he wrote:

> The bearer of the decomposed animal-organic material is the examining finger, the operating hand, instruments, bedclothes, atmospheric air, sponges, the hands of midwives or nurses which come in contact with the excrement of women sick with puerperal fever and afterwards handle pregnant or parturient women. In other words, the bearer of the decomposed animal-organic material is anything which is soiled by a decomposed animal-organic material and comes in contact with the genitalia of these patients.

Insufficient sterilization of either hands, instruments or swabs or contamination of these, although previously rendered sterile, are both equally responsible for the introduction of infection. The source of the contamination is equally important. It may be from the ordinary filth beneath the finger nails. It may be from an infected focus on the person, for example a septic throat, or an infected finger or even a nasal discharge. It may also be introduced from some other outside source; the medical attendant may have been attending an infected wound, a case of erysipelas or even a case of puerperal infection. He may also have been present at a *post mortem* examination or at an operation on some septic patient.

Thus the possibilities of contamination are very great and the sources legion in number and to add to these dangers the bacteria by reason of "passage" appear to become increasingly virulent.

Hence it appears that the ubiquitous organism can only be excluded from contact by the application of the most rigorous rules of asepsis and antisepsis. The simplest of these are always practicable and were they carried out, infection due to contact or in other words introduced could not result.

Thus will be seen the origin of that form to be described as preventible is evident, but the origin of the other form known as autogenous or unavoidable must remain in doubt. But the significance and frequency of the former in contrast to the latter leaves no doubt as to the first requirements in the prevention of infection and these must not become shadowed by the lesser but more complicated problem of autoinfection.

The infecting organisms one has seen are of almost infinite variety and ubiquitous in their distribution.

Contact is the key word of the situation, as it appears that with very few exceptions the organism is so introduced. As contact is inevitable and in order that infection may not result, the duties of the accoucheur are:

1. To insure initial sterility of his hands and appliances and to maintain that sterility.

2. To sterilize as far as may be possible the lower part of the genital tract.

3. To avoid the transference of organisms from the perianal and perineal skin and all other unsterilized surfaces to the genital tract.

4. To resterilize the genital tract as far as may be possible whenever such transference may reasonably be supposed to have occurred.

5. To leave the uterus empty and well retracted and to promote free drainage from the vagina afterwards.

6. To prevent the bruising and devitalization of the soft parts due to prolonged pressure during labour. (Berkeley and Bonney.)

In due course these will be more fully referred to.

The Pathological Anatomy of Puerperal Infection.

In such a paper as this the pathological anatomy must be mentioned, although not in detail.

In order to understand the rationale of prevention and cure, it is, however, of the utmost importance that the nature of the lesions resulting from and the paths of spread of the process be very fully understood.

In all puerperal infections a primary lesion must exist, though this may not always be evident. Moreover, in patients presenting similar clinical features, there may exist a very wide variation of lesions. These variations occur in an almost infinite series, grading from the puerperal ulcer to an extensive inflammatory process involving the whole genital tract and even extending beyond into the parametrium and peritoneum and finally even resulting in systemic infection. In other words, owing to the rapidity of the invasion no local lesions become evident, the organisms passing directly into the blood stream, the *sepsis foudroyante* of the French authors.

The primary lesion may be situated in any part of the genital tract, including also the perineum. From this infection may spread: (i.) by continuity, producing a consecutive lesion or (ii.) by transportation *viâ* the blood stream to remote parts, producing a metastatic lesion or lesions.

The primary lesion is most commonly situated at the placental site and in the majority of cases the morbid process is limited to the endometrium. The cervix is less commonly and the vagina rarely the situation of the primary lesion.

Extension from the primary focus may occur: (i.) by continuity of surface along the mucous membrane of the canal, (ii.) by lymphatics, either capillary or trunk, producing cellulitis or lymphangitis, (iii.) by venous channels, phlebitis due to venous thrombosis.

Metastatic lesions by transportation may originate from either the primary or consecutive lesions. They are of two kinds, namely toxæmic and septicæmic. In some cases both types are combined.

Of particular importance is the knowledge of the inflammatory reactions which are invoked as the result of infection entering from the endometrium (placental site). The reactions are both macroscopic and microscopic, the former represented by the necrotic decidua and the putrid lochia and the latter by the historical "leucocytic barrier" or zone of reaction.

In pathology one learns that inflammation is the response to irritation in order that repair may finally result. Therefore, the extent of the response, as evidenced in the reactionary changes occurring at the various lesions, must be clearly understood in order that any measures adopted in curative treatment may not cause any breach of the barriers erected by Nature's efforts of response.

PART IV.

The Prevention of Maternal Morbidity and Mortality.

The principles of prevention of maternal morbidity and mortality are quite evident and easily enumerated; their application constitutes a complex problem of the highest order.

The principles may all be embodied in such a phrase as this: Proper care, supervision and management during pregnancy, parturition and the puerperium.

The application of these principles concerns the physician, the obstetric nurse and the patient herself and is dependent on their education, training and knowledge. These will be dealt with at a later stage.

I shall now take up the elimination of the actual causes, the contributing causes and the personal factor as they arise during each period of the process. The whole scheme is centred around five great groups, namely: (i.) Infection, (ii.) toxæmias, (iii.) hæmorrhage, (iv.) dystocia, (v.) trauma.

It has been clearly demonstrated that the statistics of maternal morbidity and mortality of women whose confinements are managed and who are delivered under hospital conditions, are very much lower than those in other circumstances. It is now definitely established that by antenatal supervision almost all of the actual causes of mortality, with the exception of that due to infection, can be eliminated or if unpreventible, such conditions can be either removed by treatment before harm is done or else modified in such a manner as to lead to a happy and successful termination.

Furthermore, by the proper conduct of labour and the puerperium, that is by using strict aseptic methods and by the avoidance of any form of interference, unless there be present a definite indication for such, all morbidity and mortality can be eliminated almost in their entirety.

It is necessary to add, however, that in spite of these measures there do occur isolated fatal cases before, during or following labour which in the light of our present knowledge are classed as unavoidable, in contrast to those already classified as preventible.

De Lee states:

Without question mortality of child-birth could be reduced to one per thousand if the public were properly

instructed regarding the needful precautions and if the physicians were all capable of meeting obstetric emergencies and most important, practised an aseptic technique.

It is only necessary to add that obstetric emergencies would be reduced to a minimum were antenatal routine universally adopted.

The Rationale of Prevention as Applied to the Antenatal Period.

It is of the utmost importance that at the earliest possible period of the pregnant state all preexisting or associated diseases should be discovered. This can only be done by a complete and general examination of the future mother. Of particular importance is the existence of such conditions as pulmonary tuberculosis, cardiac disease, chronic renal disease, cancer and diabetes. The complication of pregnancy with any one of these calls for a complete survey of the situation in order that the continuation of pregnancy be decided for or against.

Again as forming part of the general examination disease of the teeth, tonsils and sinuses should be looked for, as neglect to treat such conditions has resulted in great invalidism during the puerperal period, that is a delayed morbidity and in some instances puerperal infection has arisen due to the transportation by the blood stream of organisms from such foci.

Next, taking the nausea and vomiting which occur in a little more than 50% of all pregnant women during the second and third months of pregnancy, we have now to realize that, although usually considered as normal, this may be a manifestation of some toxæmic condition. In the vast majority of cases this disappears either spontaneously or by simple treatment. However, in certain cases it may persist and become so pernicious as to threaten seriously the patient's life. The views as to the ætiology, pathology and treatment of this condition have been given by Harding and Watson, the main factors in regard to which are: (i.) The metabolic factor (this is the primary factor from the standpoint of ætiology); (ii.) the neurotic factor which ranks as second in regard to ætiology, but often demands the major part in treatment; (iii.) the intestinal intoxication factor, which is well recognized; (iv.) the factor of dehydration which has to be considered in the very severe cases.

Whatever view or views be taken, it is sufficient to say that with proper treatment the condition should be successfully cleared up.

On the other hand, however, fatal cases do occur, but almost always the patients are already profoundly toxic before advice or treatment is sought. Thus, although usually more frequent and fatal in *multiparæ* than in *primiparæ*, yet it is comparatively common to meet the condition among single women and can be explained by the neurotic factor.

Carl Braun dealing with 150,000 obstetric cases did not observe a single fatal case due to this condition; it is recognized that it is extremely rare with proper prenatal supervision and treatment.

The most striking illustration of the necessity for universal prenatal examination is afforded by the cases of eclampsia and albuminuria of pregnancy.

It is of particular importance to the obstetrician of today that he be aware of the pathological changes in the viscera resulting from all these diseases of pregnancy grouped under the general term toxæmia. Albuminuria may occur in pregnancy due either to a preexisting renal lesion or else as part of a toxæmic process. The Germans describe both "the liver and the kidney of pregnancy" as pathological entities. It is not generally admitted, however, that pregnancy itself ordinarily interferes with the kidneys to such an extent as to cause changes of a degenerative nature. Yet one meets patients with signs of a mild grade of chronic nephritis in whom no other history excepting that of previous pregnancy can be obtained to show any cause for it. In other words, these conditions belong to the category of a remote morbidity.

By various combinations of signs and symptoms one is able to recognize a commencing toxæmic condition and particularly by various biochemical examinations of blood and urine one can form an estimate of the extent to which the hepatic or renal function has been depleted and *pari passu* with this estimate to what extent these organs have been damaged. Moreover, in cases of albuminuria one can form the opinion as to whether it is due to a preexisting renal lesion or the result of a toxæmic process. Aided by this knowledge during the antenatal period the routine examination of the urine and the taking of the blood pressure form the best guide as to the onset of toxæmia.

On the first signs or symptoms of defective hepatic or renal function, one immediately takes steps to restore that function by management or treatment, that is one allows the pregnant state to continue or else one promptly terminates it, according to the response or otherwise to the treatment.

With the single exception of puerperal infection which has already been stated to be responsible for more than 40% of all deaths due to the pregnant state, eclampsia itself is the next single cause of the greatest number of fatal results. Not only this, but the fact that in the treatment of eclampsia the added dangers of various forms of operative obstetrics as still practised and the increased liability to sepsis in such cases, be it only a simple forceps extraction, make in addition a formidable contribution to both the mortality and morbidity.

It has been conclusively proved that by routine antenatal supervision and proper treatment the actual onset of eclampsia can be almost entirely prevented. And what is equally important in the light of our present day knowledge as to the exact cause of eclampsia, is that in those patients with toxæmia who receive prenatal treatment and in spite of this convulsions supervene, there is rarely if ever any mortality.

Fitzgibbon adds his opinion that those patients admitted into hospital in a preeclamptic state, will not develope convulsions if eliminative treatment is commenced and maintained for six hours.

This is also forcibly illustrated by J. C. Windeyer, who reports that of a series of 615 patients with albuminuria of pregnancy during the last seven and

a half years at the Royal Hospital for Women, Sydney, only seven actually developed eclampsia and of these all recovered, the disease being mild in form. Also during the last four years at the Women's Hospital, Melbourne, of the patients with albuminuria of pregnancy receiving antenatal treatment none has died.

How is the morbidity influenced? It has already been stated that an increased liability for infection to develope is present in these patients following any instrumental or other operative procedures. Consequently these must be strictly minimized in the treatment of this condition and only performed when an absolute indication is present.

Hæmorrhage is a symptom demanding immediate attention during the prenatal period. In the early months it is most frequently the symptom of threatened or inevitable abortion. Under suitable treatment in many cases of threatened abortion, gestation may continue and the hæmorrhage ceases. It is, however, in cases of incomplete abortion that operative procedures are instituted and these are frequently associated with much morbidity. Criminal abortion is rife throughout the Commonwealth and many women die as the result of such procedure from either septicæmia or peritonitis. If they do not die, inflammatory pelvic lesions cause in many women life long invalidism.

The curette is an instrument which is a menace and a dangerous weapon in the hands of those who do not recognize the indications for its introduction into the uterus. Apart from abortion hæmorrhage during this period may be due to the presence of an ectopic gestation, either alone or rarely coexistent with the uterine pregnancy.

Vesicular or hydatidiform mole very frequently is diagnosed following on a hæmorrhage. This condition, although uncommon, appears to be increasing in frequency. In Rotunda Hospital, Dublin, during the ten years ended 1920, there were only nine cases of this condition amongst 19,995 deliveries on the obstetric side and yet in the following three years there were eleven such cases. Its importance lies in two directions: Firstly, the liability to morbidity on account of the number of curettage operations rendered necessary and secondly, the dangers of either its local recurrence or else the formation and dissemination of the very malignant chorionic carcinoma.

In the later months of pregnancy, apart from premature labour due to the existence of syphilis or chronic renal disease and cardiac disease, hæmorrhage during this period is usually symptomatic of morbid conditions associated with great mortality and often morbidity.

This type of hæmorrhage, described as *ante partum* hæmorrhage, has been divided into two great groups, namely accidental and inevitable. Accidental hæmorrhage may be either internal, external or combined. It may be simply the result of a slight trauma or of some mechanical factor, but nowadays one recognizes it more often as a symptom of a grave toxæmic process, sometimes fulminating in the rapidity of its onset.

Young and Miller, of Edinburgh, have recently drawn attention to the very frequent coexistence of albuminuria in cases of *ante partum* hæmorrhage and this has been confirmed also by Fitzgibbon.

In mild cases treatment is on expectant lines; after the collapse has been treated, the management is on the same rigid lines as for toxæmia.

A large concealed internal hæmorrhage demands the utmost expediency in treatment in order to avoid a fatal ending. Happily such cases are rare, but all authorities are now almost agreed that immediate delivery by Cæsarean section offers the best prognosis in cases of such severity. Often this operation has to be further complicated by an additional hysterectomy owing to the complete disintegration of the uterus and its extreme atonic condition. Therefore, let the attendant be fully aware in the latter months of pregnancy of the significance of albuminuria with hæmorrhage, be it either internal or external; even if it be apparently of insignificant amount.

Of more frequent occurrence and therefore of greater importance is the hæmorrhage termed inevitable or unavoidable. A painless hæmorrhage with no apparent cause during this period is almost always due to *placenta prævia*. This condition demands always immediate treatment. The exact cause of the condition is not known and in consequence it cannot be prevented, but by suitable treatment one should always be able to avert a fatal termination. It is met with more frequently in *multiparæ* than in *primiparæ*. This has been illustrated by the figures from the Rotunda Hospital, Dublin, where of a hundred consecutive patients with *placenta prævia* occurring during a period of seven years, all excepting three were *multiparæ*.

A prognosis of the condition may be thus expressed: The first or any hæmorrhage may be fatal. Therefore, the primary indication is to control the hæmorrhage and not necessarily to empty the uterus. This fact is not reasonably appreciated and hence unnecessary operative procedures including various forms of *accouchement forcé* are performed in its treatment with resulting high mortality and morbidity. Theoretically speaking, no case of *placenta prævia* if promptly diagnosed and treated should end fatally.

Therefore, in the antenatal clinic a woman is instructed to report any hæmorrhage immediately and it should be added, even though it be painless.

The greatest mortality naturally occurs amongst those not receiving such supervision. A series of painless hæmorrhage, even though individually each one be of small quantity, very rapidly produces the exsanguinated condition so well known; this is frequently the state of the patient when she is seen for the first time. All forms of operative interference are a danger owing to the added shock and it is in just such a condition that infection is very likely to supervene; death may be due either to hæmorrhage and shock or later on to infection. Even if the patient recovers, she is liable to the consequences of chronic infection and traumatism following on operative procedures and she often

suffers for some little time from the added anæmia. Hence the treatment of *placenta prævia* demands the utmost conservatism combined with knowledge and judgement.

Any likely causes of dystocia should either be detected or prognosticated without loss of time by routine prenatal examination. The causes of such dystocia as is evident during this stage may be divided into three groups:

(i.) Disproportion between pelvis and presenting part.
(ii.) Malpresentation;
(iii.) Mechanical obstructions.

In the first group routine external pelvimetry will very often indicate the existence of any pelvic contraction or deformity. This may be followed up by a vaginal examination and, if necessary, by internal pelvimetry. In such a case in which some degree of pelvic contraction exists, one is at once in a position to decide on the future course of either pregnancy or labour, so that finally any interference rendered necessary may be carried out under the very best of circumstances and conditions before the onset of signs or symptoms indicative of danger to either mother or child. In other words an operation of election may be performed, such as Cæsarean section or else following the performance of Müller's or Munro Kerr's tests, a trial of labour may be given and then if necessary an operation of selection chosen, according to the exigencies of the situation.

Another cause of disproportion is post-maturity of the fœtus; this should never be allowed to occur to such a degree as to cause dystocia. By prenatal supervision and examination dystocia resulting from this cause should be entirely eliminated.

A third cause of disproportion is due to malformation and tumours of the fœtus itself. These, unless gross, are often difficult to detect before the onset of labour, but when detected the question of termination of pregnancy should be promptly considered.

Malpresentations can almost always be detected before labour by abdominal palpation. Hence correction can be performed or if it is not corrected or if it recurs after correction, the accoucheur is prewarned of the dangers. Mechanical obstructions of labour should almost always be detected before labour occurs. Ordinary tumours and atresias of cervix, vagina or vulva can be detected by vaginal examination.

Another form of mechanical obstruction is the result of the condition described as sacculation, that is anterior or posterior development of the uterus.

The third and most important form of obstruction is a tumour of the uterus or ovary. These tumours require careful consideration and their discovery before the onset of labour is of the utmost importance. Generally speaking, fibro-myomata of the uterus rarely cause serious obstruction during labour. They are comparatively uncommon as a complication of pregnancy and in the majority of cases labour has proceeded normally and terminated spontaneously, even when there was much apprehension as to the possible result. However, there are four clearly defined indications for their removal during pregnancy. These are: (i.) torsion, (ii.) degeneration, (iii.) pressure symptoms caused by the tumour, (iv.) when from its size, situation and type obstruction during labour is certain to result. In this latter case the advisability of performing Cæsarean section at term must be considered either with myomectomy or hysterectomy.

In regard to cysts of the ovary they should be removed as soon as discovered, if prior to a month or six weeks before the date of expected labour. These cysts are extremely liable to cause complications due to torsion, infection, gangrene, rupture or degeneration and in addition they may cause actual obstruction. If these cysts are not detected until late in pregnancy, there are three alternatives: (i.) ovariotomy, allowing labour to proceed normally, (ii.) ovariotomy combined with Cæsarean section at term, (iii.) spontaneous labour, followed later by ovariotomy.

It is obvious that the last procedure is only feasible where no obstruction is caused by the cyst and of the others I agree with Williams that Cæsarean section and ovariotomy at term give the best results.

It will be seen that by careful routine examination during the stage before labour the cause of any possible dystocia can be either discovered or predicted. Furthermore, in many cases its removal is possible or else the timely knowledge is gained as to the ultimate outlook on pregnancy and labour.

Infection has been shown to be almost always introduced from without during the actual course of labour. Yet it is possible that the occurrence of those cases described as infrequent and unavoidable may be influenced during the antenatal period. This is concerned with the personal cleanliness and hygiene which is often sadly lacking; on careful inquiry other habits during the latter part of pregnancy (already referred to) which may be responsible for the introduction of infection, may be discovered and advised against. It is, however, of practical importance that the bacteriology of any abnormal discharges from the vagina be investigated, particularly for the presence of the gonococcus. All gonococcal infections of the lower part of the genital tract thus recognized should at once receive energetic treatment, so also should all septic conditions around the vulva, such as eczema, impetigo, intertrigo and various parasitic conditions.

In this manner will the incidence of some fatal complications be lessened, but many more women will be spared the ill health due to extension upwards of an inflammatory process during the puerperal period.

Advice regarding the care of the breasts in order to insure that lactation proceeds normally is important throughout this stage. The proper preparation of the nipples and breasts very greatly minimizes the incidence of cracks, fissures and ulcers which form the portals of entry of organisms causing inflammatory diseases of the breasts.

No remarks about this period would be complete without reference to syphilis. Although in itself not a factor in causing mortality, the morbidity due to the frequent occurrence and recurrence of abortions and premature labours is considerable. Fowler and Fairley demonstrated conclusively that its incidence, as met with in the antenatal clinic, is from 7% to 10% and showed the excellent results of treatment to both mother and child during this stage. Therefore its existence must never be lost sight of and the ideal would be to have a systematic Wassermann test of the blood of all patients attending an antenatal centre. This is easily possible, but in private practice is scarcely practicable, at any rate at the present day. However, it is demanded when the history suggests the presence of conceptional syphilis. By this means a very great saving in infantile mortality is also effected and one of the greatest scourges amongst mankind is dealt a very direct blow.

An analysis of the Commonwealth statistics for 1923 is interesting. There was an average mortality of one in one hundred and ninety-four women confined or 5·11 per thousand live births. On further analysis the proportion of deaths in married women was found to be one to two hundred and one, whilst amongst single women it was one to one hundred and thirteen. This illustrates in a striking manner the result of secrecy and corresponding lack of care on the part of the single woman.

In connexion with the continuation of employment or work during this period this will be more fully considered in the section on industrial welfare.

The Rationale of Prevention as Applied to the Period of Labour.

As the result of the information gained from the prenatal period the obstetrician is now able to predict normal labour with reasonable accuracy or else is prepared to meet any emergency by suitable measures. From normal labour, theoretically and in practice, no deaths should result and no morbidity should arise, yet both do occur. Even with the previous knowledge of the existence of some abnormality likely to complicate labour, maternal mortality should for all practical purposes be still nil and the morbidity resulting should be either limited or else avoidable. I say practically nil, for naturally there exists a certain, but very slight, anæsthetic risk and also the risk of any operation, for example laparotomy. In spite of this knowledge there is a definite death rate for which both the causes and contributing cause are fully known and almost all are preventible. What is the reason for this? How can perfection be obtained?

Prevention of infection during labour is our first aim. Infection may be introduced not only during the necessary manipulations required for completing delivery, but also during the progress of labour itself. It is of practical importance that the onset and the progress of labour be diagnosed and followed. This can be carried out in almost every normal case without having resource to vaginal examination. Unfortunately, this fact is either unknown or not fully appreciated by either doctor or nurse or even both and so vaginal examinations have come to be a routine and are one of the most constant factors in the introduction of infection. There is an explanation for this. Not so very long ago it was the custom in maternity teaching hospitals for the house surgeon, student and nurse to examine vaginally every case admitted in labour or otherwise. Certainly abdominal palpation was also practised and taught, but as it was not relied on alone, the same importance was not attached to it as to vaginal examination. What was the result? There may not have been any increase in the infection mortality and morbidity among the patients of the hospital, but these students and nurses after qualifying would be sadly inefficient in gaining their required knowledge by any other means excepting vaginal examination. This in very many instances would be done without hesitation or consideration.

At the Rotunda Hospital, Dublin, for instance, no student or even resident post-graduate is allowed to make any vaginal examination and it is only carried out by the master or assistant masters when the definite abnormality so indicates it. Progress of all cases is noted by abdominal palpation and in some instances by rectal examination as well. The students go out into the externe department and are able to follow and conduct their cases without a single vaginal examination and then again as graduates they continue as they have been taught.

One of the greatest values of the antenatal clinic for the training of the students is that derived from abdominal palpation. This training both of the nurse and student should be continued into the lying-in ward, where vaginal examinations should be generally forbidden and only exceptionally performed under the personal supervision of a competent person.

In this manner will our nurses and students enter practice without the desire to make the vaginal examination almost their first act after reaching the bedside of the mother, of course with her full approbation. One finds in private practice how frequent is the astonishment not only of the engaged nurse, but also of the patient and members of this household if such examination is omitted.

The conduct and management of normal labour are so fully dealt with in textbooks as to appear out of place here, yet the abuses and compromises as practised make this period the most dangerous of all. Almost all agree that for the conduct of labour all the rules of asepsis should be applied as carefully as though it were a major surgical operation. Yet in spite of this doctrine, almost universally believed in, one still occasionally meets physicians who do not see the necessity for shaving the vulva and more often still patients who will not submit to it. Still more frequent amongst general practitioners is the disregard for the use of rubber gloves; this will be dealt with in another place. Another procedure which I do not approve

of, is the prophylactic vaginal douche as it does not fulfil its purpose and may be the means of introduction of organisms.

Were these fundamental principles of asepsis generally adhered to, the problem would assume simple dimensions. Unfortunately, however, it has not done so and I have now arrived at the crux of the situation as it exists today.

And here must be written the exposure and the denunciation of "meddlesome midwifery" or to put it in other words: "too much interference of the normal labour processes by men that do not know how" (De Lee).

My own additional comment would be "and by others who are adept at this procedure."

There would appear to be three reasons for this. Firstly, the physician through faulty diagnosis and probably ignorance of the mechanism of labour fails to recognize some minor peculiarity in an otherwise normal woman. This is not surprising after one has read a textbook in which about three-quarters of its space is taken up with descriptions of "abnormal conditions calling for active treatment and often operative interference" (Gibbon Fitzgibbon). Moreover, the fact is overlooked that 90% of labours are perfectly normal and so an impression is gained that in every one there is something which must be done. This "something" having been done, is the reason why so often a normal labour is unwittingly converted into an abnormal one.

It has also been lost sight of that the primary objective in an abnormal labour "is to remove the abnormality and then rely on the normal state to continue" (Fitzgibbon).

Secondly, the physician though fully aware of all the features of the case, wishes to terminate it quickly in order to fulfil another engagement.

Thirdly, the attendant is urged and encouraged by both the patient and her relatives to secure an early and rapid delivery. In other words, to quote THE MEDICAL JOURNAL OF AUSTRALIA'S leading article of September 20, 1924:

> The general practitioner will admit that the relatives and friends, aided and abetted only too often by the nurse or midwife, often clamour for the early application of the forceps and rapid delivery. If the general practitioner refuses and continues to refuse to be party to this form of meddlesome midwifery, his services will not be required on future occasions or for other patients and a less scrupulous practitioner will be called in. It is obvious that a public campaign must be started to educate the public concerning the disadvantages and dangers associated with the unnecessary application of forceps and indeed with all unneeded forms of interference with Nature.

It is often in these cases that the knowledge and remembrance of all the principles of asepsis proves to be a fool's paradise.

The practitioner armed to the teeth with antiseptics, sterile gloved hands and sterilized instruments rushes in unappreciative of the injuries that so easily result and the ease with which organisms are introduced to gain the ascendancy.

In other cases, unhappily, both antiseptics and asepsis are sadly deficient. The attendant is soon away, the patient and her friends congratulating one another, but at a what a price; a visit to the septic ward of a women's hospital will inform any one as to this. In this then lies the tragedy and its avoidance should be an easy matter, could we but control the individual, his conscience and his knowledge; in other words, the personal equation.

The education of the public is an essential as well.

The improper application of forceps constitutes at present the greatest menace to any improvement in our morbidity and mortality statistics. As the most frequent cause of trauma and the introduction of infecting organisms it is responsible for many fatalities, but still greater is the frequency of the occurrence of morbidity, both immediate and remote.

The absolute indications and the extended indications for the application of forceps are fully and clearly indicated in all textbooks. These also define what is still more important, namely that certain conditions must be fulfilled before such application is justifiable. The complete fulfilment of these conditions is so frequently neglected or unawaited in private practice that this failure constitutes the greatest factor in the production of both morbidity and mortality.

Under two such conditions as the following is the application frequently performed: (i.) before complete effacement and dilatation of the cervix and (ii.) in the presence of malpresentation or disproportion. The first is illustrated most frequently and happily under normal conditions, usually as the result of hurry or else anxiety on the part of the patient or her relations. The second is primarily the result of lack of antenatal care and supervision. A doctor is engaged along with the nurse at some period during pregnancy. He takes out a book and from a table marks down the date of expected labour. He may ask for an occasional specimen of urine to be sent and his parting advice is: "You will be all right; tell the nurse to send for me when the time comes." Finally, if labour commences during the daytime, he may be informed of its onset, but his only concern is with the degree of dilation of the cervix. When told that this is complete, he arrives in time to deliver the *"coup de grace"* with forceps, but in many cases he finds he is unable to do this. In others, by brute force he succeeds in delivering the child, either dead or else so injured that it dies later from intracranial lesions or else it may survive as a cripple with Little's disease or with its mentality seriously impaired. The type of case in which delivery cannot be effected is well termed the "failed forceps" case. In both classes of case, successful or otherwise, the injuries inflicted on the poor mother are of varied dimensions. Perhaps the simplest is the lacerated perineum. This is usually expertly repaired. The patient is proud of the number of stitches, yet so ignorant as to the aftermath.

On the other hand when a midwife conducts a case, apparently slight perineal lacerations are neglected by her, as she considers their occurrence a reflection on her dexterity. The severest form is

the lacerated cervix with a tear running up the vaginal vault into the broad ligaments and involving the lower uterine segment.

Happily it is rarer to see the completely ruptured perineum, as the accoucheur having applied the forceps is adroit at delivery.

Between these grades all degrees of injury can be inflicted and if the patient does not succumb to infection or shock, she is liable to every possible form of disease in the genital tract, whch becomes evident either during her stay in bed or later when nursing her infant and performing her household duties.

It is the "failed forceps" case which greatly augments the mortality statistics of a maternity hospital. The patient usually arrives after several attempts with forceps have been made and very often two individuals have combined in their efforts. Her general condition is often good and the child still alive, but very often there is either secondary inertia or the condition of threatened (and sometimes even actual) rupture.

Such a condition taxes the resources and judgement of the most experienced obstetrician when deciding the best procedure to adopt. In any case his measures cannot but further aggravate the ultimate prognosis. This class of labour would become of great rarity if proper antenatal routine were everywhere carried out.

Thus will be evident the most frequent contributing causes of infection during the stage of labour itself. To summarize them they are:

1. The lack of aseptic practice on the part of both nurse and doctor before, during and after delivery.
2. The unnecessary performance of frequent vaginal examinations.
3. The neglect to make full use of abdominal palpation.
4. The use of prophylactic vaginal douches.
5. The neglect to repair perineal lacerations.
6. The performance of unnecessary and unindicated manipulations and operations.

In the words of Crédé: "Limit as far as possible the puerperal wounds and prevent the infection of the necessary puerperal wounds."

It has already been stated that one of the advances made in obstetrics was the appreciation of the indications for and the technique of the various obstetric operations. This brings me to discuss what part these operations play in the cause of morbidity and mortality.

The most frequent operation performed, namely the application of forceps, has already been fully discussed. Taking next the various mutilating operations, it is well known that they form important contributing factors in the production of infection, hæmorrhage and shock. Undertaken as they most usually are after the failure to deliver with forceps, the patient already is either exhausted or most probably infected. Thus they are associated very often with mortality and very frequently are followed by much morbidity. The operations referred to are craniotomy and the crushing operations, embryotomy, decapitation *et cetera*.

Happily as the result of our prenatal care and knowledge these operations should very rarely be required, being simply the enforced measures in cases of extreme urgency. The only exceptions, of course, are in those rare cases of hydrocephalus, fœtal tumour and fœtal monstrosity.

It is, however, in those women who have not been examined before labour was well established that these operations are still a valuable asset and one not sufficiently availed of. For instance, it is to be used if an attempt to deliver with forceps fails and the child is dead or dying and the patient obviously infected. In contrast to the method of a brutal forceps delivery, craniotomy here offers a comparatively easy procedure and one which should be completed with little or no trauma to the woman.

The neglected shoulder presentation is, as its name implies, the result of failure of rectification of a transverse lie. Were prenatal examination a routine, the existence of such a lie would always become known and as a result of the timely recognition either the abnormality could be corrected or if this were not possible, a suitable procedure could be decided upon. The neglected shoulder presentation, on the other hand, is encountered when for the first time during the course of pregnancy and labour a medical man comes to make an examination. It is in such cases that the emergency operations of decapitation, evisceration, cleidotomy or some other procedures have to be performed.

In a different class, however, may be placed the operations of: (i.) tentative application of forceps, (ii.) version, (iii.) pubiotomy, (iv.) Cæsarean section. The indications for these are well known, but in spite of them mortality and morbidity will continue.

Forceps upon the floating head is so seldom justifiable that this operation should be relegated to the same position in obstetrics as is *accouchement forcé*.

The high forceps operation, when the application is tentatively made, often proves successful in attaining delivery in those labours in which forceps applied in the usual manner has failed; this is particularly the case if resort be had to the additional procedure or manœuvre of placing the patient in Walcher's position.

Among general practitioners this position is not sufficiently appreciated or made use of and were it more often adopted, the "failed forceps case," with its attendant train of injuries, would still more seldom be encountered.

Version is an obstetrical operation of very great value in saving the future employment of other more serious methods. During the antenatal period a breech or transverse presentation may be converted by external version into the more favourable presentation. Podalic version is considered by many to be the treatment *par excellence* of the condition *placenta prævia*.

During labour, however, it becomes an operation of selection; thus, by podalic version a transverse presentation may be rectified and even in a neglected shoulder presentation, if it be not too far advanced and if anæsthesia be deeply induced, this conservative measure very often meets with success. In minor degrees of pelvic contraction, associated with abnormal head presentations, particularly in flattened pelves, version is often the operation of choice. In performing version for this complication in the presence of generally contracted pelvis, a word of warning must be sounded, for I do not consider that version is advisable under these circumstances. In Australia the latter variety is encountered much more frequently than the former.

Mention must be made of prophylactic version as advocated by Potter. This revolutionary doctrine was fully explained in Potter's "Monograph" in 1922. Further mention than this will not be made, for the fear of encouragement it may give to others to interfere with a physiological and mostly spontaneous process.

Pubiotomy is an operation of very great value when carried out by a competent operator in suitable surroundings. The statistics of the Rotunda Hospital show that this operation has been most successful. Very little morbidity has resulted from it and the difficulty of the patient in locomotion, so frequently referred to, has not been encountered there.

It is not to be classed strictly as an emergency operation, but rather one of selection following a trial of labour. The management of the trial of labour and the facts to be deduced from it are very admirably set out in Fitzgibbon's "Practical Midwifery."

Thus in a patient examined prenatally when there is a doubt as to the exact degree of disproportion, a trial of labour may later indicate the performance of pubiotomy.

Even in dealing with patients seen for the first time when in labour, pubiotomy is of decided value. I recall such a case at the Rotunda. This was an impacted mentoposterior presentation with the chin on the perineum; the baby was alive. Pubiotomy was performed with happy results to both mother and child.

I have now reached the place to consider Cæsarean section, which of late has been discussed throughout the world more than any other operation in obstetrics. It is an operation often attended with mortality but certainly always with some morbidity. The indications for Cæsarean section are very clearly defined. Unfortunately, the operation is comparatively easy and many practitioners with the knowledge of aseptic circumstances and conditions, possessing knowledge of the great improvements in its technique have freely abused the indications. So freely is it performed that in the State of Massachusetts during the year 1921 after frank puerperal septicæmia Cæsarean section constituted the second most common cause of death in child-birth (Williams). This statement followed as the result of the efforts of a committee who endeavoured to find out why the mortality from child-birth was greater for 1920 than for the ten preceding years.

What is the position of this operation at the present day? It is easily performed, no other obstetric operation has been so improved by technique, hospital accommodation is readily obtained and last, but not least, the public are fully aware of the frequency with which this operation is performed. In spite of this there is a definite mortality consequential to the operation which even in selected cases and in the hands of experts has been estimated at about 1·6%.

Routh in 1911 reported a mortality of 9·7% in 1,508 classical sections at the hands of one hundred British operators.

Eardley Holland reported one of 4% in a series of 4,197 operations done in thirty-seven British hospitals during the ten years ended 1921.

Individual operators, however, report a large series of cases with little or no mortality; thus Freund had no deaths after five hundred and fifty-one operations. My comment on these series is: Were all sections performed for an absolute indication?

One thing, however, is very certain. No matter how skilled the operator and how perfect his technique, the mortality will only be low in women who are uninfected. That is to say, if performed as an operation of election or within a very short time of the onset of the first pains, then only will the lowest mortality statistics be obtainable. After this the percentage mortality increases progressively with every additional hour of delay.

The following table is quoted from Holland's article based upon 1,953 sections for contracted pelvis.

Time of Operation.	Number of Patients.	Mortality.
Before labour	1,202	1·6%
Early in labour	389	1·8%
Late in labour	220	10·0%
After induction of labour	35	14·0%
After attempts at delivery by forceps	107	27·0%
Total	1,953	4·3%

Morrison states that the percentage mortality may be taken as 2% in primary and up to 30% in secondary cases. He also states that the mortality increases in the following circumstances: (i.) with the length of labour, 1% for every two hours (De Lee); (ii.) with the rupture of the membranes; (iii.) with the number of vaginal examinations made, (iv.) with attempts at delivery *per vaginam*; (v.) with the lack of skill of the operator.

In spite of these figures illustrating how great is the mortality due to infection, Farquhar Murray

recently reported a series of operations on patients obviously infected, in which he had adopted a new technique in the performance of Cæsarean section; his results appear to be encouraging. In some of his cases the infant was already dead before section was made, but the degrees of pelvic contraction were extreme (Edinburgh Obstetrical Society, May 14, 1924).

It will thus be clearly seen that the number of deaths occurring every year following on this universally performed operation must be very great.

The morbidity in those who survive, is even greater. It has been estimated that the after histories show that (i.) in 3% of the patients rupture of the uterus occurred in a subsequent confinement; (ii.) 30% of the patients miscarried in a later pregnancy; (iii.) 30% remained sterile. In addition there remains the injury to the abdominal wall and the possible sequel of a ventral hernia. In reference to these figures in 1922, Eardley Holland estimated that rupture of the uterus occurred in from 2% to 4% of patients subsequently becoming pregnant. On account of this danger that famous obstetrician Craigin stated: "Once a Cæsarean, always a Cæsarean!"

Recent work of Munro Kerr on the histology of the healing of the uterine wound reveals that in many instances there is a complete bridge of regenerated muscle between the edges of the incision. The possibility of spontaneous labour following a previous Cæsarean section has been amply demonstrated and in the light of our present knowledge Craigin's dictum cannot be wholly accepted.

The occurrence of spontaneous labour following these sections has recently been witnessed in two interesting cases. In one the patient was previously delivered by section for eclampsia and in the other section for *placenta prævia* had previously been performed.

That Cæsarean section, therefore, constitutes a most dangerous weapon in the hands of a few there can be no doubt. Perfection in technique is greatly to blame for this.

Were antenatal supervision universal, Cæsarean section would much more frequently be performed as an operation of election and only as an operation of selection on a still uninfected case. The latter indication would apply in those women subjected to a trial of labour under proper aseptic and antiseptic conditions and circumstances.

Were it fully realized that from 70% to 80% of all labours associated with all grades of contracted pelvis would terminate spontaneously if left alone, the present tendency towards abuse of a valuable method of procedure would end and our morbidity and mortality figures decrease.

Mention must now be made of two conditions which are held to be indications for the performance of Cæsarean section.

Placenta prævia is the first condition in point. It has already been stated that in a case of *placenta prævia* the primary indication is to control the hæmorrhage. This condition is most frequently met with in *multiparæ* and in them there should not exist "undue exaltation of the child's life over that of the mother." This is especially so, as so very frequently the child is premature.

Fitzgibbon states: "The treatment of *placenta prævia* does not depend on the situation of the placenta, but on the question of whether the cervix admits two fingers or not."

This is almost always the case when encountered in a *multipara*.

The induction of labour and the termination of pregnancy are only secondary indications and hence podalic version offers the easiest, simplest and best way of meeting the primary indication and at the same time is the most conservative method of fulfilling the secondary indications.

Fitzgibbon goes on to say in referring to Cæsarean section: "that it should only be considered in a *primipara*, where the fœtus is near term and the mother prepared to undergo the additional risk for the better chance of a living child." The mother should also be informed of the future morbidity arising from the operation and of the possibility that all her future pregnancies will have to be terminated by section. This, of course, should not be taken into account in the case of an elderly *primipara*.

The statistics of the Rotunda Hospital fully support their contention that "the Rotunda Hospital has at all times and still condemns the practice."

Fitzgibbon has since qualified his previous opinion by adding to it the case of the *primipara* who has reached term, on account of the added risk of breech delivery in an already debilitated subject.

The second condition in point is eclampsia. The treatment of eclampsia by the non-operative methods of Stroganoff and the Dublin school has given such excellent results that it is very difficult to understand the rationale of any operative methods. Moreover, Eden following an analysis of the British records, concluded that the highest mortality followed the employment of Cæsarean section and *accouchement forcé* and that excepting *accouchement forcé* Cæsarean section was the most dangerous method of treatment.

In America the mortality of Cæsarean section for eclampsia was 25·8% and in Great Britain 32%. In spite of these very alarming figures many authorities advocate the performance of Cæsarean section as the best method of treatment in a fulminating case unresponsive to eliminative treatment occurring in a *primipara* not in labour; in this I agree.

In contrast to Cæsarean section stands the operation for induction of premature labour. Its indications are clearly defined and with the full development of antenatal routine the value of this procedure will become more fully appreciated.

The methods employed today are well known and should be perfectly safe and easy procedures. They are divided into operative and medicinal. The former as most commonly practised consists of the introduction of sterile bougies. This is Krause's method and the one in most common use. On account of difficulty experienced in sterilizing the

bougie, Fitzgibbon instead introduces a sterilized rubber stomach tube, size No. 24. This can be perfectly sterilized by boiling and immediately introduced through the cervix.

Other methods still adopted are the introduction of the de Ribes bag and packing of the cervix and vagina.

These methods all have their uses and their supporters, but all are liable to cause infection, though in my experience of Krause's methods this has never occurred.

The medicinal method by the administration of quinine, castor oil and pituitrin has been placed on a sound basis by Watson and fully confirmed by Browne. In a large series under Watson it was successful in 90% of patients at or about term and in 75% of women for whom premature induction was desired. It has the very great advantage that there is no risk of introducing infection. No bad result has been reported following on the use of pituitrin. Indeed, in the presence of nephritis and eclamptic toxæmias this method has been of great value on account of the great liability in these patients to develope sepsis. Browne definitely asserts that the high blood pressure is not a contra-indication for its use and moreover, it often causes a fall.

The value of this obstetric operation as a means of preventing morbidity and mortality is especially seen in the prenatal treatment of the toxæmias and when dystocia is predicted, either on account of disproportion due to contracted pelvis or on account of postmaturity. Its greatest value perhaps lies in the fact that it is a conservative measure and the careful study of its indications will lead to a very great reduction in the number of Cæsarean sections performed. This was admirably demonstrated by Sherwin (THE MEDICAL JOURNAL OF AUSTRALIA, January 21, 1922).

Although its value in contracted pelvis has not been endorsed by Williams, yet practically all British authorities are agreed that it is of great use. Indeed I do not hesitate to dogmatize by stating that with the increasing importance of antenatal work this operation will be found to be much more frequently indicated and will be performed with the result that there will be a corresponding diminution in the too large number of Cæsarean sections. Thus will our mortality and in particular our morbidity be lessened to a very material extent.

I now come to deal with "the indiscreet and indiscriminate use of pituitrin regardless of indication."

I do not think that this applies to conditions existing in Australia, but it is most important to point out the very great dangers and sequelæ likely to arise following its abuse.

It has already been shown to form an integral part of the medicinal method of induction of labour. Its value after completion of the third stage is too well known to be more than mentioned. Its value during labour in certain cases of primary inertia is also well known, but is its use justifiable?

I am of the opinion that were it frequently resorted to in stimulating the processes of labour, there would be immediately a noticeable increase in the number of manual removals of placenta required and this would without any doubt increase both the morbidity and mortality.

Also in those patients who had not received antenatal examination, disproportion would pass unrecognized and were pituitrin given to such a patient, the result might be disastrous.

It is now necessary to consider the condition of rupture of the uterus. This accident is one of the most serious that can occur. Except in rare cases of spontaneous rupture during pregnancy, it most frequently occurs in prolonged and obstructed labours and is here termed "traumatic rupture." It is due to ill-judged manipulations on the part of the medical attendant when the lower uterine segment is excessively stretched and it may also be due to an upward extension from a cervical laceration as already mentioned in connexion with the application of forceps.

In contracted pelvis when pituitrin was given injudiciously rupture has occurred many times; next to this in frequency it is liable to occur in the operation of version for a neglected shoulder presentation. Lastly rupture of the uterus may occur through the scar of a previous Cæsarean section.

Death may result from hæmorrhage, shock or infection. The prevention of this condition is intimately concerned with complete examination during the prenatal period and the intelligent management and conduct of labour.

(To be Continued.)

Reviews.

TESTICULAR TUMOURS.

"MALIGNANT DISEASE OF THE TESTICLE" by Dr. Harold R. Dew is a welcome addition to the literature of a somewhat rare condition about which a great deal of confusion exists.[1]

Dr. Dew is Honorary Surgeon to Out-Patients at the Melbourne Hospital and was formerly First Assistant to the Walter and Eliza Hall Institute of Research in Pathology and Medicine of Melbourne. He is to be highly complimented on his monograph, which secured for him the well deserved honour of the award of the Jacksonian prize in 1923.

The book is well written and is profusely illustrated with coloured plates, sketches, photographs and microphotographs all of which are beautifully reproduced and help to make it a most attractive publication. It contains chapters on the anatomy and development of the testicle, morbid anatomy and histology, ætiology, clinical aspects and diagnosis, prognosis and treatment and there is an appendix containing detailed histories of forty cases. References to the literature on the subject are given at the end of each chapter, one hundred and twenty-nine such references being included.

After dealing with the anatomy and development Dr. Dew gives an historical sketch of the classification of testicular tumours and points out that the cause of failure in the past has been due to the tendency to give an opinion

[1] "Malignant Disease of the Testicle: Its Pathology, Diagnosis and Treatment," by Harold R. Dew, M.B., B.S. (Melbourne), F.R.C.S. (England), F.A.C.S.; 1925. London: H. K. Lewis and Company, Limited. Royal 8vo., pp. 168 with illustrations. Price: 21s. net.

on the examination of one small piece of the growth and on the failure of many pathologists to correlate accurately the morbid anatomy and the clinical observations.

He approaches the subject from the histogenetic standpoint and classifies them into three main groups, the teratomata, the carcinomata and the sarcomata.

The teratomata are tumours in which structures from all three of the primary germinal layers can be found and are divided into three subgroups: mixed tumours, chorionic carcinomata and dermoids. Mixed tumours are the commonest tumours of the testicle. In these either the hypoblastic or mesoblastic structures predominate and it is the predominance of one tissue almost to the exclusion of all others which has led to such a variety of diagnoses in the past. As he points out, tumours described as chondromata, osteomata, cystomata, rhabdosarcomata, adenomata *et cetera* are almost certainly all teratomata. The tumour of the testicle first described by James Paget in 1885 teaches a useful lesson. It was for some time regarded as evidence of the possibility of a chondroma behaving as a malignant growth, but on being reexamined by Nicholson was found to be of teratogenous origin. These tumours usually terminate in malignant disease and the teratogenous carcinomata so formed account for almost half the malignant tumours of the testicle.

In chorionic carcinomata the epiblastic elements have assumed malignant characteristics. They have the same microscopical appearance as similar growths of the uterus and like them give rise to distant metastases. As Nicholson points out they differ from the uterine form only in tending to develope blood vessels of their own.

The dermoids are by far the rarest of the teratomata. It is interesting to note, that when they terminate in malignant disease the carcinoma developes usually from the hypoblastic elements and not from the epiblastic structures as one would expect and as not infrequently happens in the closely allied ovarian dermoid.

The teratomata usually end in malignant disease and the subsequent carcinomata have a remarkable tendency to invade the veins, giving rise to cell masses in the vessels and heart, the so-called "*sarcome angioplastique.*"

The carcinomata (seminoma) represent about 45% of the total tumours. They are composed of masses of rounded epithelial cells (spheroidal carcinoma) and have in the past been confused with the sarcomata. They are not nearly so malignant as the teratogenous carcinomata and rarely if ever invade the circulation. He agrees with Chevassu that they arise from the seminal tubules, but goes still further and affirms that they take their origin from the cells of Sertoli.

The sarcomata are by far the rarest tumours of the testicle and are often bilateral.

In discussing the ætiology of testicular growths the author lays great stress on trauma as a provocative factor. He discusses also infection and misplaced organs and their connexion with tumour formation. Testicular tumours usually manifest themselves during the period of active sexual life, the teratomata appearing at about twenty-five and the carcinomata at about forty years of age. The sarcomata may apper at any age.

He recognizes three distinct clinical types: (i.) Those in which the disease is confined to the scrotum; (ii.) those in which it has extended to the glands and viscera; (iii.) those in which the tumour has originated in an abnormally placed organ.

The benign tumours usually go unnoticed for a long time until some trauma draws attention to them by producing a hydrocele or hæmorrhage or by stirring the neoplastic cells into fresh activity with a sudden increase in the size of the swelling. The spheroidal carcinomata give rise on the average to the largest swellings and some of the teratogenous tumours may give rise to metastases and death while the primary growth is still very small. The teratomata may be partly translucent and an effusion when present is usually straw-coloured and clear. Despite the statements made in many textbooks a blood-stained fluid is never seen except as a result of trauma.

The differential diagnosis is freely discussed. Dr. Dew states very definitely that any swelling of the scrotal contents which behaves in an atypical manner, should be suspect and there should be no hesitation in advising and insisting on an exploratory incision as the indispensable and final means of diagnosis.

In discussing treatment Dr. Dew condemns the operation of simple orchidectomy the mortality from which within four years is between 80% and 90%. He makes a strong plea for the early radical operation, which is described in minute detail. Great stress is laid on the preliminary ligature of the cord, as by this means metastases *viâ* the lymphatics or blood vessels from the increased trauma to which the growth is subjected at operation, are avoided. The radical operation followed by deep X ray therapy offers by far the greatest hope of recovery, especially if the patient has been seen early enough. Testicular tumours are amongst the most malignant of all neoplasms and any delay in recognition or treatment is fraught with great danger to the patient.

The book is very readable and extremely interesting and is sure to stimulate further work on the subject. It can be read with profit by all practitioners of medicine and to those interested in malignant disease will give much food for thought.

By an oversight Dr. Dew has failed to acknowledge his debt to the Walter and Eliza Hall Institute of Research in Melbourne which supplied the materials and assistance, and to its Director, Dr. C. H. Kellaway. Dr. Dew and the Institute are to be highly complimented on the work which is the best of its kind that has been done.

DERMATOLOGY.

"DISEASES OF THE SKIN" in the "Catechism Series" by J. Ferguson Smith, M.A., M.B., is written by a man evidently worthy of a better fate than that of writer of a cram book.[1]

The material contained in the book is for the most part excellent, recent researches in ætiology and pathology being generally mentioned and modern methods of treatment given, but so briefly as to be of little value except for cramming. To a practitioner already familiar with the subject, the outlines given are sufficient to inform him that the writer knows the subject, but would be comparatively of little value for the purpose of teaching a student uninformed in the subject. It is a pity therefore that the author had not seen his way clear to expand his work and make his publication a small textbook suitable for students.

In addition to this, lack of clarity in dealing with the subject of eczema is a bad fault. Having started off well by defining eczema as a reaction of the skin to an irritant almost invariably chemical and having also rejoiced in the separation of the fungus infections "formerly lumped together as Cheiropompholyx," the author proceeds to throw these fungus infections on the already overcrowded muckheap which some folk call eczema. Surely infective processes at any rate can be withdrawn from this rubbish heap and be correctly and accurately labelled as something quite separate from eczema or dermatitis, so that these terms may be reserved for skin reactions in response to chemical or physical irritants.

Again having asked "What is Seborrhœa," he answers the question quite wrongly: "A chronic superficial dermatitis." Of course he means seborrhœic dermatitis, a condidition which requires as a basis a skin in the state of seborrhœa, or in other words a skin subject to a flow of grease in which medium the organisms producing seborrhœic dermatitis grow and produce toxins which in turn provoke the seborrhœic dermatitis. It is quite wrong to use as a designation for a condition to which this particular type of skin is liable, a term required to label natural greasiness of the skin, a congenital peculiarity personal or familial, the converse of which is xeroderma or ichthyosis.

To sum up, while the material in the book with a few easily rectifiable exceptions is excellent, the method of exposition as a catechism is very unfortunate.

[1] "Catechism Series: Diseases of the Skin," by J. Ferguson Smith, M.A., M.B.; 1926. Edinburgh: E. and S. Livingstone. Crown 8vo., pp. 88. Price: 1s. 6d. net.

The Medical Journal of Australia

SATURDAY, MAY 29, 1926.

The Problem of the Cripple.

THE economic welfare and progress of a nation depend in large measure on the number of persons who are fit. Fitness in its turn denotes bodily health and mental vigour. With the attaining and retaining of both these attributes the medical profession is chiefly concerned. It is difficult to form an estimate of the number of cripples in the Commonwealth Although upwards of forty-two thousand persons are in receipt of invalid pensions, this fact is not of much assistance, for illness of every description may form the basis of a claim for this pension and information is not available as to the percentage of cripples who receive the pension. Nor would assistance be gained from estimating the number of persons living who in preceding years had suffered from such a disease as acute poliomyelitis, unless some means were available of discovering the amount of residual paralysis that occurred in each patient. Dr. Wilfred Vickers has pointed out recently that if the percentage of cripples in New York City were applied to New South Wales, that State would be the home of approximately fourteen thousand cripples. It is doubtful whether such a finding would be justified for not only are conditions in New York and in Australia entirely different, but we have no knowledge of the degree of disability that has been regarded in New York as constituting crippling. The statement may, however, be made with safety that the persons in the Commonwealth who suffer such bodily deformity and disability that they are seriously handicapped in life, number many thousands.

The problem of the cripple must be approached in two ways, firstly that of prevention and secondly that of education and adaptation. The preventive aspect involves the consideration of such diseases as acute anterior poliomyelitis, tuberculosis and rickets. In regard to the prevention of congenital abnormalities of structure little can be done. During 1925 the number of cases of anterior poliomyelitis notified in the several States of the Commonwealth was two hundred and fifty-six. The amount of residual paralysis from those infections is potentially large. Tuberculosis affecting bones and joints carries with it a heavy toll of deformity and disability. Rickets must not be forgotten, although it does not occur so frequently in Australia as in other parts of the world. The prevention of these diseases need not be discussed in detail, but emphasis must be laid on the fact that relief of the cripple is not so important as the prevention of the conditions which made him a cripple.

The question of the treatment of the cripple himself is a large one and demands thought and attention which so far it has not received throughout the Commonwealth. It may be stated with confidence that no person suffering from bodily deformity which may be mitigated by orthopædic measures, need go without treatment. Among other matters of importance in this connexion is the question of education. A child with a tuberculous lesion of a joint spends on an average two years as an inmate of a hospital. Frequently the time is much longer. Under the old condition of affairs any instruction of the child was at best meagre and given in a haphazard fashion. For the last three years the Department of Public Instruction of New South Wales has had a specially selected teacher attached to the Royal Alexandra Hospital for Children. This teacher gives regular instruction to all the inmates of the institution who are suffering from chronic conditions. The pupil is graded according to his mental age and the work is so coordinated that when he is transferred to the Convalescent Branch at Collaroy, a second teacher takes up the threads and carries on the teaching along the same lines. This is a beginning. We understand that the heads of the Department are satisfied with what has been done so far.

From the economic standpoint the vocational training and employment of the cripple are of equal importance. He must be placed in such a position that he will not feel inferior to other men in earning capacity. That this can be done has been amply proved by Henry Ford in his well known book "My

Life and Work." Ford analysed the jobs in his factory. He found that they were 7,882 in number; of these 3,595 required no physical exertion, 670 could be filled by legless men, 2,637 by one-legged men, two by armless men, 715 by one-armed men and ten by blind men. At Ford's factory no one applying for work is refused on account of his physical condition. Ford holds that if an industrial institution is to fill its whole rôle, it ought to be possible for the employees to manifest the same degrees of fitness as are found in society in general. With this most thinking people will agree.

There are several directions in which steps can be taken in connexion with this problem. When perfect coordination exists between the medical profession and the health authorities prevention of disease will reach its highest point. The education departments of the several States must join forces with the hospitals and other institutions in which the crippled or potentially crippled are resident. Employers of labour must be brought to realize their responsibility and to follow along the lines indicated by Henry Ford. This could be done by the establishment of a central bureau at which cripples would be able to ascertain where suitable employment was obtainable. Such a bureau should be controlled by the State. The State could find a large number of suitable positions and through the influence of the bureau suitable openings would be discovered or created in the field of private enterprise. Finally, much more will be possible if, as Dr. Vickers has suggested, a survey of cripples is made. Dr. Vickers has not indicated how this can be done. Probably the State departments of health are the only bodies which could devise satisfactory machinery for such an object. In any case the State should realize that the system of giving doles to cripples is not the best way of treating them from either the economic or personal standpoints.

Current Comment.

CARDIAC EFFICIENCY.

IT is often forgotten by clinicians that a full understanding of the effects of pathological processes affecting an organ is impossible, unless the function of that organ has been determined. It is not enough to know that the organ has work of a certain nature to perform and that it achieves this object by means of certain chemical, physical or biological activities. The mechanism, whether it be chemical or physical, must be analysed, measured and evaluated. No teaching in pathology is sound that is not based on accurate physiological data. This is especially true of the heart. The heart is usually regarded as an apparatus for the pumping of the blood into the arterial system. Until James Mackenzie and other modern cardiologists applied the findings of exact observations, it was held that the pump remained efficient as long as the valves were competent and as long as the cardiac muscle could eject the contents of the ventricles into the arteries without expending the whole of their power. The recognition of the greater importance of the muscular and nervous integrity of the heart denoted a distinct advance in the clinical appreciation of the essence of cardiac disease. But it ignored a still more important aspect of the cardiac function. By giving prominence to the mechanical nature of the heart, clinicians appeared to lose sight of the fact that it is the chief organ of respiration and that its output of energy, like all other functional activities, is governed by the nature and extent of chemical reactions. The law of supply and demand obtains. The blood to sustain life must carry oxygen to the tissues and must be in readiness to allow an excess of the products of oxidation to escape. It is obvious that the velocity of the circulating blood is an important factor; the faster the blood flows through the capillaries, the lower must be the oxygen unsaturation, if the demand of the tissues is to be satisfied.

A great deal of valuable information has been elicited by Professor Yandell Henderson during the past few years. The starting point of the study of the efficiency of the heart must necessarily be the determination of the rate of absorption of oxygen and other gases by the blood through the membranes of the pulmonary alveoli. It has been determined that even when velocity of the blood through the lungs is raised as a result of great and persistent muscular effort, the diffusion of gases through the alveolar wall is practically instantaneous. Provided that the lungs are normal, the oxygen unsaturation of the blood in the lungs is necessarily low. That means that the blood in the lungs will take up oxygen with each breath in sufficient quantity to bring the amount almost to its maximum oxygen carrying capacity. Each hundred cubic centimetres will hold between sixteen and eighteen cubic centimetres of oxygen. Under the conditions of extreme effort as much as fourteen cubic centimetres may be claimed by the tissues, but ordinarily four or five cubic centimetres are liberated. Professor Yandell Henderson has shown that measurements of the oxygen consumption and of the difference of the oxygen content of the arterial and of the venous blood are the indices of the capacity for muscular exercise of an individual.[1] In order to obtain this

[1] *The Lancet*, December 19 and 26, 1925.

information it is necessary to determine the volume of blood pumped by the heart at each beat and the amount of oxygen consumed by the body. By experiment he has discovered that the arterio-venous oxygen difference is practically constant for each mammalian animal. Like the osmotic pressure and the hydrogen ion concentration, this difference is regarded as a vital constant. It lies around 3% to 4%.

It will be remembered that Rubner demonstrated a long time ago that the heat production and the oxygen consumption of all mammals vary in direct proportion to the area of their skin surface. Professor Henderson finds that the volume of the blood pumped by the heart is also proportionate to the area of the skin surface. By actual measurement he determined that all vigorous mammals propel about three or four litres of blood each minute for each square metre of skin surface. If this be true, small mammals will have to produce an increased number of heart beats per minute to keep up the volume of blood as compared with those larger mammals whose ventricles are more capacious. The volume of blood propelled in one minute is determined by the frequency of the beat and the volume of blood discharged at each beat. Professor Henderson, like many other physiologists, has striven to measure the stroke volume, for it is obvious that on this measurement all the other calculations must depend. Others have devised ingenious methods, but each of these methods has been proved to be unreliable and unsuited for clinical use. The method devised by Professor Henderson opens up a vista of clinical application of enormous importance. Direct and indirect measurements have revealed that the amount of blood pumped at each beat by a mammalian heart is proportionate to the body weight and not surface. For each kilogram of body weight the heart propels about 1·4 to 1·8 cubic centimetres of blood. It has further been shown that the pulse or heart beat rate of a resting mammal is a function of the ratio of the body surface to the body weight.

We have not the space at our disposal to follow step by step the progress of Professor Yandell Henderson's researches. Much of the foregoing and many of the details of his work are not new. The reader must study the articles published by Professor Henderson during the past two years for the missing information. A brief description of his method of measuring the stroke volume must be given, for, as has been indicated above, the possibility of gauging the efficiency of the heart depends on its accuracy. This volume cannot be measured by direct methods. Fick pointed out many years ago that the quotient of the oxygen consumption divided by the arterio-venous oxygen difference represents this volume. Samples of blood can be taken from the right cavities of the heart and from the arteries in animals without danger, but such manipulations have not been attempted in man. Haldane and Priestley devised in 1905 a method of collecting the alveolar air and of analysing it, to determine the oxygen content of arterial blood, for the the alveolar air is in gaseous equilibrium with the arterial blood. Plesch introduced a method of collecting air in equilibrium with the venous blood of the lungs. But these methods can scarcely be employed clinically. Krogh and Lindhard endeavoured to measure the stroke volume by estimating the rate of absorption of nitrous oxide into the blood. Professor Henderson recognizes the great value of their work, notwithstanding the fact that there were large variations in the measurements due to defects in the method. These observers held it to be essential that the procedure must be completed before the blood in the heart has time to return to the heart through the veins, that is within thirty to forty seconds. Professor Henderson profited by their errors. He and Dr. H. W. Haggard sought and found a volatile substance of low solubility in blood which could be conveniently and safely used for their purpose. This substance is ethyl iodide. They proved that it has a coefficient of distribution between air and blood in the lungs of two; that is the amount of the substance taken up by the blood is twice the amount contained in the alveolar air. The method is as follows. A quantity of liquid ethyl iodide is vaporized in one hundred litres of air in a spirometer. The subject inhales the vapour mixture through a rubber tube and the expired air passes through the mixing chamber. The basal metabolism can be estimated at the same time. The iodine content of the inspired and the expired air is determined by a simple analysis which anyone can carry out. The volume of air breathed per minute as indicated by the spirometer is multiplied by the difference in the amount of ethyl iodide in the inspired and the expired air and divided by twice the amount found in the alveolar air. This gives the volume of blood passing through the heart per minute. The method has been tested in the laboratory and controlled by direct measurements in animals and by the complicated indirect methods. It has been found to yield constant results. A healthy man at rest has a stroke volume of about 1·5 cubic centimetres for each kilogram body weight. The circulating blood measures between five and seven litres per minute during rest and may rise to thirty litres in an athlete after extreme effort. Professor Henderson has thus provided a method of measuring the cardiac efficiency of persons in health or with heart disease, without risk, without elaborate apparatus and without the exercise of special skill or experience. The efficiency is expressed as a measure of muscular energy of the heart correlated with a measure of the gaseous exchange in the tissues and is in consequence capable of direct applications to the problems of disease. In principle this measurement recognizes the heart as an organ of respiration, the main factor in determining the amount of oxygen that is carried to the tissues. It should yield information concerning the amount of extra strain that a person with an impaired cardiac muscle can impose with relative safety on his heart. Finally it can be used for the purpose of studying the processes of shock, of heart failure and of impending death.

Abstracts from Current Medical Literature.

PÆDIATRICS.

Brain Tumour in Children.

MACDONALD CRITCHLEY (*British Journal of Children's Diseases*, October-December, 1925) analyses one hundred and twenty-five cases of brain tumour in children. A table is given illustrating the rarity of tumour in the first few years of life. Only one case occurred during infancy and three in the first thirty-six months of life. The frequency gradually increases up to the age of eight years, after which a fairly uniform level is maintained. In discussing the site of the tumours the author draws attention to the relative preponderance of subtentorial over supratentorial growths. Out of one hundred and twenty-five tumours fifty-nine or 47·2% were situated in the pons or cerebellum. Tumours of the cerebral hemispheres numbered thirty-four or 27·2%. Fourteen were classified as "pituitary or suprapituitary." Tuberculomata occurred most frequently, the masses being often multiple. They usually occur in the region of the pons or of the cerebellum, though not infrequently other similar masses coexist in the hemispheres. Gliomata rank second in frequency. These often break down to form degeneration cysts which show but slight tendency to reformation after operative evacuation. Sarcomata are third in importance. They do not form metastases and rarely infiltrate the meninges or skull. Gummata, endotheliomata and neurofibromata occur in much smaller proportions. The pituitary tumours present no constant histological picture. The diagnosis of intracranial neoplasm should be made before the triad of headache, vomiting and papillœdema occur. Headache occurs at some time in the course of most cerebral tumours. Pain is usually less severe in children than in adults. In children there is also tendency to spontaneous cure of the headache. Sudden relief from pain is usually accompanied by the cessation of vomiting and by the onset of blindness. At the same time enlargement of the head becomes evident. A sudden separation of the sutures of the skull occurs, causing an immediate decrease in the intracranial hypertension. An alteration in the child's disposition is often the earliest and most prominent symptom. Somnolence is a persistent feature from the outset in some cases, especially when the growth is in the neighbourhood of the diencephalon and mesencephalon. Vomiting occurs in most patients sooner or later. Early morning vomiting is very common. Increased intracranial tension leads in most instances to dilatation of the ventricles of the brain. Palpation of the skull may reveal areas of local tenderness. Papillœdema appears earliest and is most intense in growths under the tentorium. Frontal and temporo-sphenoidal tumours also cause early fundal changes, with tumours situated in the pons, *centrum ovale*, the *falx cerebri*, meninges and the pituitary gland papillœdema is slight or absent. Convulsive attacks with or without unconsciousness may occur at any stage. Fits are uncommon in pontine and mesencephalic growths. In most cases the march of the disease is progressively downwards. In some cases one or two remissions may occur. There may be an interval of two or three years before the symptoms recur. This phenomenon of remission is, the writer believes, suggestive of tuberculomata situated in the ponto-cerebellar regions.

Indications for Blood Transfusion in Infants.

K. SCHMIDT (*Klinische Wochenschrift*, January 1, 1926) refers to the recent widening of the indications for intravenous blood transfusion in infants. It was formerly the custom to reserve transfusion for severe grades of anæmia. Anæmia is not a disease, but a manifestation of some damage to the blood forming apparatus. This may be due to a constitutional factor, but faulty nutrition or some blood borne infection may play the main part in many instances. It may be extremely difficult to tell whether the anæmia is a primary one or secondary to these other factors. Blood transfusion will raise the resistance of the infant to respiratory troubles, pyelitis and other infections. The degree of anæmia present is no longer considered to be of primary importance and transfusion is being resorted to for various infantile diseases. In particular has it been used for various stages of food decomposition and atrophy, erythrodermia and acute and chronic pneumonia. He has employed transfusion in twenty cases with only three failures. These were due to agglutination of the mother's corpuscles in the first case, severe furunculosis causing death in the second and a thrombosis of the sinus from which the child recovered in the third case.

Pachymeningitis Hæmorrhagica.

R. DEBRÉ and G. SEMELAIGNE (*La Presse Médicale*, March 17, 1926) discuss *pachymeningitis hæmorrhagica* in infants. That this condition is not so infrequent as is generally supposed, is claimed from the fact that the authors have observed five definite cases and two probable cases in one year. The apparent rarity of this condition is probably due to the fact that it is not recognized. The disease usually attacks infants from the ages of two to six months, more rarely from six months to a year. As a rule the infants show no other sign of illness. They have developed normally, their weight and length are normal. The onset of the illness is sometimes slow and insidious. The infant who continues to show signs of good health, presents slight manifestations of nervous disturbance such as excitability and insomnia. The doctor is usually consulted because the mother has noticed that the child does not hold up its head. She may also have remarked a slight enlargement of the head. There may be vomiting, anorexia and loss of weight. Convulsions may occur, sometimes coming on abruptly and ceasing as abruptly, the infant manifesting no sign of illness in the interval. On the other hand the convulsions may precede periods of rigidity with head retraction and spasm of the limbs, raised temperature, strabismus and nystagmus. The condition in these cases is grave from the outset and the infant falls rapidly into coma. Whatever the mode of onset, on examination one sign is generally visible, namely a modification of the shape of the cranium. This may be so slight that only careful observation can detect it. The size of the head is slightly enlarged, the forehead is high and prominent, the anterior fontanelle is large, tense and bulging. The sutures are separated, especially the interparietal. The posterior fontanelle is widely open. In order to establish the diagnosis it is necessary to make an ophthalmic examination and to puncture the fontanelle. It is because these examinations are not made that the clinician fails to recognize the condition. Puncture of the fontanelle is done in the lateral angle of the fontanelle outside the middle line. On gentle insertion of the needle a few millimetres through the *dura mater* a hæmorrhagic fluid appears. The amount of fluid collected varies from ten or twenty to thirty or forty cubic centimetres. Its colour passes from dark or light red in recent hæmorrhages to more or less deep yellow in older hæmorrhages. After the fluid has been allowed to stand a deposit of red corpuscles appears. The supernatant fluid is yellow. If the tube is shaken the liquid becomes homogeneous again and its original colour returns. Culture of the fluid is sterile. On ophthalmoscopic examination in about half the cases a modification of the fundus is seen, which joined to the previous findings furnishes a pathognomonic syndrome. Unilateral or bilateral hæmorrhages are present in the retina. These may be accompanied by hæmorrhages of the vitreous or of the conjunctiva. In some cases papillœdema may be observed and even optic atrophy. The ultimate prognosis is difficult to establish. Even if the various symptoms diminish, a guarded prognosis should be given, as about half the infants succumb during the course of the disease. But it is not always fatal. Survival is not rare. In other cases in spite of clinical recovery a sequel such as strabismus, Little's syndrome *et cetera* may persist. Overlapping of the sutures also occurs owing to the retraction consequent on the disappearance of the intracranial effusion. The diagnosis is easy if this condition is thought of and if search is made for the pathognomonic signs. In tuberculous meningitis of which the symptomatology in infants is indefi-

nite, hæmorrhages into the subarachnoid space are observed. This fluid may be distinguished by the presence of lymphocytosis and the presence of the tubercle bacillus. There is no difficulty in distinguishing clinically between obstetrical meningeal hæmorrhages and pachymeningitis. In the first case the suggestion of traumatism is always present. Labour has been difficult, the infant has been born asphyxiated. When the infant survives, the signs of hydrocephalus do not appear and puncture of the fontanelle rapidly fails to yield the characteristic fluid. On the other hand, the symptoms of *pachymeningitis hæmorrhagica* always appear after a month or two of life when the confinement has been normal. The diagnosis from meningeal hæmorrhages from thrombosis of the cranial sinuses, such as occurs in infectious states, is more difficult. If the thrombosis occurs in the course of an acute infection or accompanying *otitis media* the diagnosis may be made. In those cases which occur in marasmic infants, it is difficult to distinguish meningeal hæmorrhage from pachymeningitis. In the authors' opinion hereditary syphilis is the principal if not the only cause of pachymeningitis in infants. In two of their patients antisyphilitic treatment seemed to bring about definite improvement. With regard to treatment the authors recommend mercurial inunctions with injections of bismuth. To relieve the pressure on the brain and for diagnostic purposes puncture through the fontanelle should be performed. This procedure should not be repeated too often owing to danger of traumatism and of introducing infection. The recognition of *pachymeningitis hæmorrhagica* in infants explains certain nervous symptoms which have hitherto been difficult to understand.

ORTHOPÆDIC SURGERY.

Transplantation of the Nerve Supply of Muscle.

J. E. STEWART (*Journal of Bone and Joint Surgery*, October, 1926) reports an experimental study of the transplantation of the nerve supply of muscles. The animals used were dogs and the experiments were carried out as follows. Under anæsthesia both thighs were opened anteriorly, the *rectus femoris* muscles were isolated and their nerves divided. On the left side the *rectus femoris* muscle was divided transversely. A segment was then taken from the *sartorius* muscle at the entrance of its nerve supply and this was sutured into the gap in the *rectus femoris*. On the right side the *rectus femoris* muscle was divided transversely and resutured without the nerve-muscle transplant. The animals were allowed to walk as soon as they had recovered from the anæsthetic. In a second series the thigh was opened and the femoral nerve was dissected out from its origin to its point of division in the thigh. The paralysed *rectus femoris* muscle was divided and to it was sutured a segment of the *adductor longus* muscle. The conclusion arrived at from the experiments was that it is possible to restore the innervation of a paralysed muscle by transplanting a block of active muscle containing its nerve supply into it. Several points were brought out in the investigation. It was noticed that the dogs with resected *sartorius* muscle and paralysed *rectus femoris* muscle walked about normally after a few weeks. Another point was that muscles which are cut across during surgical procedures, should be accurately approximated and sutured, if the distal segment is to recover adequately.

Spondylolisthesis.

HENRY TURNER and NIKOLAS TCHIRKIN (*Journal of Bone and Joint Surgery*, October, 1925) review the opinions on the causation of spondylolisthesis and conclude that the slipping of the fifth lumbar vertebra is determined by a congenital insufficient ossification of the vertebral arch. This leads to its elongation or more generally to non-union of its articular portion. The defect may exist without producing any pathological signs or symptoms until trauma occurs, when deformity, pain and other clinical signs appear. Injuries in childhood have a more serious effect than those occurring late in life. The authors are of the opinion that it is doubtful whether operative measures can aid conservative treatment or arrest the progress of the ailment.

Obstetric Paralysis.

J. W. SEVER (*The Journal of the American Medical Association*, December 12, 1925) presents a report of eleven hundred cases of obstetric paralysis. The types of paralysis differed and there were eight hundred and twenty-nine cases of upper arm type compared with two hundred and eight cases of whole arm type. It has been supposed that breech presentations were the usual cause of the whole arm type of paralysis, but this has been disproved by the figures collected by the author. The X ray examination reveals practically nothing in the early stages, but when there is a posterior subluxation of the shoulder joint, there is seen a hooking of the acromion. In certain cases there is a dislocation of the head of the radius. Pupillary inequality is of the greatest importance. A great many cases present at first pupillary inequality with a small pupil on the affected side. If this persists together with wrist drop or the whole arm type of paralysis beyond six or eight weeks, prognosis as regards recovery is not good. With regard to treatment the author states that he is not as insistent as formerly on the use of splints and he gives his reason that a splint seems to cause a certain amount of swelling about the wrist and the elbow. He also thinks that a splint designed to relieve contracture interferes with the free use of the arm. He thinks that contractures can be prevented by physiotherapy. Operative treatment is not undertaken before the age of four or five years, but the author admits that exploration of the plexus should be undertaken, if there is no evidence of recovery after three months' treatment. He is not enthusiastic over the results of operations upon the nerves in these cases. He describes the operation he has found most successful in correcting the deformity at the shoulder joint.

Fusion of the Hip Joint for Tuberculosis.

B. P. FARRELL (*Journal of Bone and Joint Surgery*, July, 1925) recalls attention to the difficulties in obtaining a solid bony fusion in the presence of destructive infection and reduced vitality of the head and neck of the femur and of the acetabulum. In the literature the author finds only three men who reported successful fusion of the hip. The operation for arthrodesis of the hip cannot be rated among the successful surgical procedures at the time. Such an operation must be applicable to children where ossification of the femoral head and the acetabulum are incomplete. This excludes an operation dealing with the joint surfaces. It would seem that some method of extraarticular fixation affords the best hope of success especially in children. Hibbs in 1922 perfected a technique for extra-articular fusing of the hip joint by transplanting the trochanter with its periosteum and muscle attachment undisturbed so as to make contact above with the ilium and below with the femur with the limb in flexion and abduction. Six patients have been operated upon, but it is too early to make a report.

Arthrodesis for Tuberculosis of the Sacro-iliac Joint.

M. N. SMITH-PETERSEN and W. A. ROGERS (*The Journal of the American Medical Association*, January 2, 1926) presents a study based on thirteen cases in which operation was performed for tuberculosis of the sacro-iliac joint. They claim that the results obtained warrant a distinctly more optimistic attitude than has hitherto been entertained. In dealing with tuberculosis the authors feel justified in saying that the pain of sciatica is typical of any condition involving the sacro-iliac joint. The almost constant distribution is over the posterior aspect of the thigh and leg. Tables are given analysing the various physical findings. In only 38% of the cases was pain elicited on pressure of the iliac crests. Of the patients treated 69% have returned to their previous occupation. Pain was lost by 92% after operation. There were four deaths in the series. One patient died from secondary infection of an abscess, another from tuberculous meningitis, two others from tuberculous peritonitis. In no instance did death occur as a result of the operation. The operation performed is not described excepting in the legends beneath the illustrations.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Royal Alexandra Hospital for Children, Camperdown, Sydney, on May 13, 1926. The meeting took the form of a series of demonstrations by the members of the honorary staff.

Hodgkin's Disease.

DR. E. H. M. STEPHEN showed a male patient, aged nine years, who had been admitted to hospital on August 16, 1922, with enlarged glands in the axillæ. At that time the glands had been enlarged for five years and the patient had complained of feeling tired for one week. Examination had revealed a large abdomen, dull in the flanks and tympanitic around the umbilicus. The edge of the liver had been palpable and the lower margin of the spleen had been felt 7·5 centimetres (three inches) below the costal margin. It had been discovered that the glands in both groins were enlarged as well as those in the axillæ and that the mucous membranes were very pale.

A blood count taken on August 17, 1922, had yielded the following results:

Erythrocytes, 2,000,000 per cubic millimetre;
Hæmoglobin value, 40%;
Leucocytes, 3,000 per cubic millimetre;
Polymorphonuclear cells, 30%;
Eosinophile cells, 4%;
Lymphocytes, 62%;
Mononuclear cells, 2%.

Poikilocytosis, anisocytosis and punctate basophilia were found. A few myelocytes with normoblasts and megaloblasts were present.

A blood count taken on August 22, 1922, had yielded the following results:

Erythrocytes, 4,000,000 per cubic millimetre;
Hæmoglobin value, 60%;
Leucocytes, 7,000 per cubic millimetre;
Polymorphonuclear cells, 55%;
Lymphocytes, 36%;
Eosinophile cells, 2%;
Monocytes, 4%.

At this time the blood picture had indicated a remarkable capacity for recovery and had changed to one of slight anæmia. The child had been discharged "relieved" on September 22, 1922.

He had been readmitted on September 22, 1925, with a history that he was always ailing. For five days prior to admission he had complained of pain in the right costal margin, worse on coughing. At the same time there had been associated malaise and feverishness. Examination had revealed a pale boy with a large mass in the right axilla, suggestive of a collection of glands held together by a soft stroma. No enlargement of the glands of the neck had been present, but the inguinal glands were palpable. Impairment of percussion note had been present over the whole of the right lung, the breath sounds had been diminished slightly at the right base and a definite pleuritic rub had been audible on the right side anteriorly.

Pink Disease.

Dr. Stephen's second patient was a girl, aged six months, who had been admitted to hospital on February 19, 1926, suffering from pink disease. There had been a history of extreme crossness for two weeks, of profuse sweating, of photophobia, of a rash on the body for six days, of loss of weight, of coldness of the hands and feet and of hypotonus. The child had remained in hospital until March 19, 1926, during which time its weight steadily decreased, although it became much less irritable.

The child had been readmitted on April 17, 1926. On admission it had taken its food well, the extremities were warm and no rash or photophobia were present. Since that time the weight had fluctuated slightly and at the time of demonstration was less than on the date of admission.

Abscess of the Lung.

Dr. Stephen's third patient was a girl, aged five years, who suffered from abscess of the lung. The child had suffered from pneumonia at Christmastime, 1924, and had been treated as an out-patient for eight months. She had been admitted on January 20, 1926, with a history of persistent cough, expectoration of pus, loss of weight and night sweats. Impairment of the percussion note on the right upper lobe with absolute dulness of the right lower lobe and tubular breathing all over the right lung had been present. The breath had been foul and clubbing of the fingers and toes had been noticed. On February 4, 1926, the right side of the chest had been explored and 0·5 cubic centimetre of foul-smelling pus had been obtained. X ray examination had revealed dulness of the whole of the right side of the chest. The patient had been discharged on February 10, 1926.

She had been readmitted on March 22, 1926, with the cough still persisting and expectorating blood-stained, offensive pus. Dulness had been found in the right side of the chest together with tubular breathing and bronchophony.

On March 23, 1926, Dr. Hipsley had resected the seventh and eighth ribs in the mid-scapular line, had incised the pleura and exposed the fissure between the lower and middle lobes. The abscess cavity had been aspirated and a large quantity of pus and other material had been removed. The lung had been incised and a tube inserted. Subsequently subcutaneous emphysema of the posterior aspect of the chest on the right side had occurred. After removal of the tube the wound had healed and the child had made an excellent recovery.

Banti's Disease.

Dr. Stephen's next patient was a boy, aged five years, who had been admitted to hospital on January 25, 1926. He had complained of loss of power in the legs for the previous six months and had been very pale and languid. At the time of admission enlarged glands had been found in both axillæ, in the posterior triangle of the neck and in the iliac region. The spleen had been enlarged, firm and nodular. The liver had extended five centimetres (three inches) below the costal margin. Examination of the lungs had revealed dulness in both hilar regions.

A blood count made on January 26, 1926, had yielded the following results:

Erythrocytes, 2,500,000 per cubic millimetre;
Hæmoglobin value, 30%;
Leucocytes, 5,000 per cubic millimetre;
Neutrophile cells, 33%;
Lymphocytes, 62%;
Transitional and large mononuclear cells, 4%;
Eosinophile cells, 1%.

Poikilocytosis and anisocytosis were present, together with some megaloblasts and polychromatophilia. A few myelocytes were found.

The blood serum had failed to react to the Wassermann test.

On February 18, 1926, three hundred and fifty cubic centimetres of citrated blood from the father had been injected into the median basilic vein of the arm. The father had been the only donor available and his serum had caused clotting of the patient's corpuscles. On February 19, 1926, the patient had suffered from a croupy cough and had become breathless and cyanosed. These symptoms had been relieved by adrenalin. On March 25, 1926, fluid had been present in the abdominal cavity and on March 30, 1926, it had disappeared.

A blood count taken on May 5, 1926, had yielded the following result:

Erythrocytes, 2,500,000 per cubic millimetre;
Hæmoglobin value, 30%;
Leucocytes, 3,000 per cubic millimetre;
Polymorphonuclear cells, 12%;
Lymphocytes, 82%;
Monocytes, 4%;
Eosinophile cells, 2%.

Cirrhosis of the Liver and Spleen.

Dr. Stephen also showed a boy, aged five years, who had been admitted to hospital on May 3, 1926. The patient was the eldest child of his parents and the mother had had five miscarriages. The child had previously suffered from bronchitis and jaundice. There had been a history of progressive enlargement of the abdomen since February, 1925, after an attack of jaundice. The patient had also suffered from frequent epistaxis. Examination on admission had revealed an anæmic looking child with an enlarged abdomen which moved freely on respiration. The edge of the liver had been palpable 1·8 centimetres (three-quarters of an inch) below the costal margin. It had been hard but regular, the spleen had been considerably enlarged and was palpable about the level of the umbilicus. No free fluid had been found in the abdomen and no enlarged glands had been palpated. The tongue had been furred and the left tonsil enlarged and unhealthy. The pupils reacted to light and accommodation. The knee jerks were exaggerated and a flexor response had been obtained from the plantar reflex. A partial response had been obtained to the Wassermann test.

Rheumatism.

Dr. Stephen's last patient was a girl, aged eight years, who had been admitted to hospital on April 14, 1926. She had suffered from pertussis and acute rheumatism three years previously. For ten days prior to admission she had complained of pains in the various joints. On the night before admission and on the day of admission she had complained of acute pain in the abdomen, but had not vomited.

On examination the apex beat had been normal in position, but a systolic murmur conducted in the axilla had been audible. The tongue had been furred. The abdomen had not moved freely on respiration, the muscles of the lower half of the abdomen being rigid especially on the right side. Tenderness had been present on palpation all over the abdomen, but especially so in the right iliac region. No other abnormality had been found on palpation. Percussion had been normal. The child had not complained of any joint pains, but had been given a two hourly mixture of salicylate of soda. On the day following admission she had still complained of abdominal pain and the lower recti muscles had been quite rigid. Generalized tenderness of the whole of the abdominal wall had been present. Dr. Stephen pointed out that in two days the tenderness had disappeared and that it had not recurred. The child was making a good recovery.

Pneumonia and Gangrene of the Foot.

DR. M. J. PLOMLEY showed a boy, aged four years, who had been admitted to hospital on April 2, 1926. He had suffered from pneumonia at the age of three months and twenty-four hours prior to admission had become affected by a slight cough and had become flushed and drowsy. On admission his temperature had been 37·8° C. (100° F.) and the pulse rate had numbered 130 in the minute. The lower and middle lobes of the right lung had been affected. Until April 16, 1926, the patient's illness had been typical of a severe form of lobar pneumonia. On that day at 9 a.m. the general condition had improved, but the left foot had become tender and discoloured from the ankle to the ungual phalanges. The colour had been purplish with subcutaneous mottling. The foot had been very cold and no embolus had been palpable along the saphenous vein. The posterior tibial pulse had been absent, but the pulse had been felt in the popliteal space. At twelve o'clock noon some discoloration of both hands had been seen. The right side of the chest had been explored and ten cubic centimetres of clear fluid had been removed. On April 17, 1926, the left side of the chest had become involved and the left foot had become more discoloured. The discoloration of the hand had disappeared forty-eight hours after its appearance, but the left foot had become quite gangrenous. Dr. Plomley pointed out that diminution of breath sounds and dulness were present at the right base and in the right axilla. X ray examination revealed a partially collapsed lung, pneumothorax and a considerable quantity of fluid in the pleura.

Spastic Diplegia.

Dr. Plomley's second patient was a girl, aged six years, who had been admitted to hospital on March 3, 1926. She had begun to walk at two years of age and was mentally dull. Eight weeks prior to admission she had begun to lose power in the left leg. On admission examination had revealed a child who looked ill, with a dome-shaped forehead and no facial stigmata. Her heart and lungs had been normal. The liver had been slightly enlarged and the spleen palpable and tender. The pupils had been unequal, the left larger than the right. The abdominal reflexes had been present and the knee jerks exaggerated, the right more than the left. A doubtful extensor response had been obtained on both sides on elicitation of the plantar reflex. Slight rigidity had been present on movement of the right leg and the patient had complained of some pain in the right thigh. She had a jerky, spastic gait. The response to the Wassermann test had been "+++". She was being treated with mercury and bismuth.

Mongolism with Generalized Lymphatic Enlargement.

Dr. Plomley's third patient was a girl, aged four years, who had been admitted to hospital on March 30, 1926. She was a Mongol with no history of previous illness. Swelling of the cervical glands had been gradual, progressive, but not painful subsequent to tonsillectomy in November, 1925. On admission a hæmorrhagic rash had been present on the fauces and both cervical and submaxillary glands had been discrete and enlarged. No abnormality had been detected in the respiratory or cardiovascular system. The liver had been enlarged and its lower border had extended three finger breadths below the costal margin; it was regular, slightly hard and tender. The lower pole of the spleen had been palpable five centimetres (two inches) below the costal margin, it was tender. The tongue had been very dirty and coated, the teeth bad, the pharynx infected and sloughy and a hæmorrhagic rash had been present on the buccal mucosa. Diphtheria bacilli had been found in a throat swabbing, they had disappeared in a few days after the administration of diphtheria antitoxin.

On April 18, 1926, the condition had been unchanged except for a scarletiniform rash over the chest and abdomen which disappeared in forty-eight hours. Treatment had consisted of thyreoid gland extract taken by mouth and mercurial inunction. No reaction had been obtained to either the Wassermann or von Pirquet tests and no abnormality had been found on radiological examination of the chest.

A blood count had yielded the following results:

Erythrocytes, 4,500,000 per cubic millimetre;
Hæmoglobin value, 80%;
Colour index, 0·9;
Leucocytes, 8,000 per cubic millimetre;
Neutrophile cells, 12%;
Lymphocytes, 88%.

Polychromatophilia and nucleated red cells had been present.

Rumination.

Dr. Plomley's fourth patient was a baby who was admitted to hospital on January 2, 1926. The child had been fed on condensed milk. It had vomited immediately after food and had suffered from diarrhœa. The child had been dusky looking, a healed ulcer had been present on the right cornea. The blood had not reacted to the Wassermann test. No pyloric obstruction had been found on X ray examination. Vomiting had been continuous. A course of mercurial treatment had been instituted and the jaw had been bandaged, but no improvement had occurred until a thickened cereal diet was given and attention was distracted with a "dummy" after feeding.

Anæmia.

Dr. Plomley's last patient was one year and five months old and had been admitted to hospital in the first instance on May 31, 1923. The parents had given a history of malaise, anorexia and drowsiness of one week's duration. The child had become very pale. On admission the tem-

perature had been normal, the pulse rate 172 and the respiratory rate 56 in the minute. No definite wasting had been present, but the glands in groins, axillæ and neck had been enlarged. No reaction had occurred to the Wassermann test. On May 31, 1923, the erythrocytes had numbered 2,200,000 per cubic millimetre and a mixture of iron and arsenic had been given. On June 6, 1923, the number of erythrocytes had risen to 3,500,000 and six days later the total had been 3,700,000. The patient had been discharged on June 14, 1923.

The child had been readmitted on April 6, 1926, with a history that it had been perfectly well since discharge until four days previously when malaise and anorexia had been noticed. The child had been unable to sit up for twenty-four hours and had vomited. It had looked ill, the skin was a lemon yellow colour and the conjunctival mucous membrane was pale. No abnormality had been discovered in heart or chest, but the splenic dulness was increased. The child had been able to move its arms and legs. The response on attempting to elicit knee jerks had been doubtful and neither Kernig's sign nor rigidity of the neck was present. The child had been able to sit up and hold up its head. On April 9, 1926, the erythrocytes had numbered 3,000,000 per cubic millimetre and the colour index had been 0·5. After treatment with iron and arsenic the erythrocytes had increased in number and on April 22, 1926, there had been 4,300,000 per cubic millimetre, the colour index being 0·5. At the time of demonstration the splenic dulness had diminished and the child's general condition was excellent.

Pyloric Stenosis.

DR. MARGARET HARPER showed a baby, aged five months. At birth the child had weighed four kilograms (nine pounds). The child's weight had increased to nearly five kilograms in the first few weeks and then it had lost weight. It had been admitted to hospital when eleven weeks old. The child was a second baby, the first, a girl, being healthy. The history given by the mother was that the child had vomited a little from birth, but in her opinion not more than an ordinary baby might do. Vomiting had increased and had become projectile after six weeks. From that time onwards vomiting had occurred almost continually. Dr. Vickers had operated on the child by the Rammstedt method and it had made an uninterrupted recovery. Dr. Harper pointed out that one feature of interest in the case was the age at whch the child had come under observation. Another interesting point was the extreme degree of dilatation of the stomach which had been discovered at operation.

Hirschsprung's Disease.

DR. R. B. WADE showed a boy, eight years of age, who had been admitted to hospital on March 16, 1926. At that time he had been admitted with a history of having become stiff and unconscious for two minutes. While in this condition he had not passed urine or fæces. He had suffered from a similar attack six months previously. On admission the child had been semi-conscious, had made convulsive movements and had passed urine involuntarily. The abdomen had been distended, but an palpation no abnormality had been discovered. Later on the distension had become more pronounced, but relief had been obtained after irrigation of both stomach and bowel. On April 10, 1924, Dr. Sear had examined the patient radiologically and had reported the presence of Hirschsprung's disease involving the descending colon and the sigmoid.

On May 12, 1924, Dr. Wade had made a vertical incision to the right of the middle line. The colon had appeared distended and translucent, but not hypertrophied. A lateral anastomosis had been performed between the ileum and the sigmoid. Subsequently the abdomen had become very distended and the patient had vomited.

On October 27, 1924, colectomy had been performed.

On February 16, 1925, the patient had been readmitted for four days following an attack of abdominal pain and vomiting. During the child's stay in hospital no signs of obstruction had been seen.

On June 29, 1925, the patient had suffered from shivering attacks with vomiting and diarrhœa.

On November 23, 1925, the child's general condition had improved, though some of the previous symptoms were still present.

Cases Simulating Hirschsprung's Disease.

Dr. Wade's second patient was aged three years. The child had been admitted to hospital with a history of abdominal swelling of two months' duration. A daily action of the bowels had taken place without aperients or enemata. No vomiting had occurred. The appetite had been moderately good, but the child had lost weight. The child had been well nourished, its colour had been good and its tongue clean. Although general distension of the abdomen had been present, no localized swelling or peristalsis had been seen and no abnormality had been discovered on palpation. A provisional diagnosis of Hirschsprung's disease had been made. After admission to the ward the patient's appetite had been moderately good, slight constipation had been present, but enemata had produced copious action of the bowels. On X ray examination a condition resembling Hirschsprung's disease had been found. At operation the bowel had been found dilated, but not hypertrophied. The retroperitoneal glands were enlarged and one had been excised for microscopical examination. So far no report had been received. Recovery had been uneventful except for slight cough. The child's colour was pale, its bowels acted well and no distension was present.

Dr. Wade's third patient was a baby, aged seven months, with a family history of syphilis. The patient had been admitted to hospital in April, 1926, with abdominal distension. The reaction of the serum to the Wassermann test had been "+++." The patient had been discharged, but had been readmitted a few days later with gastroenteritis. The abdomen had still been distended and the liver palpable below the costal margin. An abscess in the left buttock had been incised and offensive green pus had escaped. Dr. Wade pointed out that the child's bowels were acting well, the abscess was healing, the motions were brown, but distension was still present.

Cysts of Bone.

Dr. Wade also showed a series of interesting skiagrams depicting bone cysts and explained the condition found clinically in each instance.

Facial Paralysis.

MR. F. C. ROGERS showed a girl, aged five years, who had been admitted to hospital on March 30, 1926, complaining of soreness on the right side of the neck of a week's duration. Pain had been present on movement and tenderness had been noted. No redness or swelling had been present. Subsequently the neck had started to swell and one side of the face had appeared to be twisted. The patient had then complained of earache. On examination Mr. Rogers had found a large tense swelling which was very painful behind the right ear. The right mastoid process had been tender. No otorrhœa had occurred, but œdema of the cheek anterior to the ear had been found. The right upper eyelid had been involved in the right facial paralysis, but the tongue had been only slightly affected. The pupils had reacted to light and accommodation. No strabismus had been present. On April 1, 1926, the child had complained of earache and toothache. On April 7, 1926, the teeth and ears had been treated, the ear with carbolic acid drops. A blood examination had yielded the following results:

Erythrocytes, 4,500,000 per cubic millimetre;
Hæmoglobin value, 72%;
Colour index, 0·8;
Corpuscular index, 90;
Leucocytes, 22,000 per cubic millimetre;
Polymorphonuclear cells, 78%;
Lymphocytes, 19%;
Monocytes, 3%.

On April 9, 1926, the mass had been opened under oxygen-ether anæsthesia. The pus had been evacuated and

a gauze drain inserted. Streptococci had been found in the immediate smear. No reaction had occurred to the von Pirquet test. On April 13, 1926, the patient had been sent to the Ear, Nose and Throat Department, but no abnormality had been detected. On April 14, 1926, the facial paralysis was unchanged and subsequently a Wassermann test had been carried out. No reaction occurred. On April 23, 1926, the wound had been quite dry. At the time of demonstration the child's condition was unchanged and treatment was being carried out by potassium iodide medication.

Tuberculosis of the Spine.

The second patient shown by Mr. Rogers was a girl, aged ten years, who had been admitted to hospital on February 2, 1925, with an old spinal deformity. The knee jerks had been present and no loss of power or anæsthesia had been discovered. A reaction had occurred to the von Pirquet test. On February 27, 1925, the radiologist had reported the présence of an active process affecting the lower three or four thoracic vertebræ and the patient had been given sun treatment in a leather jacket. On July 14, 1925, the radiologist had reported that the condition was apparently quiescent and on August 24, 1925, the patient had been discharged.

On March 26, 1926, the patient had been readmitted, complaining of pain in the lumbar region and of loss of power in the legs. No abnormality had been discovered on pathological examination of the urine. On April 2, 1926, the patient had suffered from frequency of micturition and a radiological report had been received to the effect that the lesion was more advanced. On April 4, 1926, the patient had suffered from retention of urine and it had been necessary to pass a catheter at regular intervals. Three days later the patient had been able to pass urine spontaneously, but control had been limited. On April 21, 1926, incontinence of urine had been present and the urine which was alkaline, had contained pus and albumin. On April 27, 1926, the patient had passed urine naturally. The urine was alkaline and hexamine with acid sodium phosphate had been ordered. No tubercle bacilli had been found in the urine and injection of a guinea pig from the urinary deposit had failed to produce tuberculosis in that animal. On May 7, 1926, a painless fluctuant swelling had made its appearance in the region of the anterior superior iliac spine.

Osteomyelitis with Pericarditis.

MR. WILFRED VICKERS, D.S.O., showed a boy, aged ten years, who had been admitted to hospital four days after an injury to the knee. On admission the patient's temperature had been 40·1° C. (104·2° F.) and the pulse rate had been 128 in the minute. The left knee and the upper third of the left leg had been swollen and painful and the knee joint distended. Tenderness had been present in the region of the left infrapatellar bursa and to a less extent over the tibia and the fibula. The tongue had been furred and the tonsils injected. The blood had been examined and the leucocytes had numbered 8,000 per cubic millimetre. The left knee joint had been aspirated and an opening made into the lateral aspect of the tibia, but no pus had been found. During the next three days incisions had been made into abscesses on the right upper and lower jaws, the lateral aspect of the femur and the medial aspect of the tibia. On the third day the patient had complained of pain over the heart and a friction rub had been discovered to the left of the sternum. Two days later the pericardium had been aspirated in the fourth intercostal space 3·75 centimetres (one and a half inches) from the middle line. Purulent fluid had been discovered and after the use of sinus forceps an incision was made into the pericardium and a drainage tube inserted. *Staphylococcus aureus* had been present in the discharge. The right wrist and ankle had become painful and swollen and the latter had been incised. The patient had then become affected by double pneumonia. Two months after pericardiotomy the discharge had ceased and the tube was removed. Radiographic examination revealed the presence of osteomyelitis of the upper end of the right tibia and the lower end of the left humerus and periostitis of the lower end of the left femur. *Staphylococcus aureus* had been found on blood culture.

The second patient shown by Dr. Vickers was a girl, aged five years, who had been admitted to hospital with a history of pain in the left thigh of three days' duration. The child had been delirious at night. Examination on admission had revealed a well nourished, delirious child with a flushed face. Tenderness had been present over the whole length of the left femur, but more pronounced in the upper half. No swelling had been present. The tongue had been furred and the fauces clear. No abnormality had been detected on examination of the alimentary, circulatory and respiratory systems.

An opening had been made into the femur distal to the trochanter, pus had been found and the child's general condition had improved slightly. During the following three days the patient had complained of pain in the left arm and forearm and a swelling of the right buttock had been noted. A month later it had been noticed that the heart dulness was increased and this was confirmed on radiological examination. The pericardium had been aspirated in the sixth intercostal space near the sternum and blood-stained fluid had been found. Foci had developed in the jaw and in the right tibia and later on erysipelas had occurred around the wound in the area of the left hip. Openings had later been made into the right tibia and sequestra had been removed from the left femur. Dr. Vickers pointed out that radiological examination had at various times revealed osteomyelitis of the right and left ulnæ, extensive osteomyelitis of the right tibia and osteomyelitis of the left femur with dislocation upwards of the head and spontaneous fracture of the shaft of the bone. The blood had at various times proved sterile on culture. Streptococci had been found in the pus from the wound in the tibia.

Osteomyelitis with Perthes's Disease.

MR. H. G. HUMPHRIES showed a boy, aged nine years, who had been admitted to hospital on July 6, 1924, with a history of pain in the left foot and leg of three days' duration together with vomiting and swelling of the leg, present for twenty-four hours. There had been no history of previous illness or of injury. The temperature had been 38·3° C. (101° F.), the pulse rate 142 and the respiratory rate 44 in the minute. On examination the the child's general condition had been good, movement of the left leg had been free and slight œdema with tenderness over the lower third of the tibia had been present. On July 8, 1924, two incisions had been made over the tibia. No pus had been found. The periosteum had appeared normal and the bone was not drilled. On the following day the child's general condition had become worse. The wound had been reopened and the bone drilled and pus under pressure had been discovered in the lower third of the medullary cavity. From then until October 2, 1924, the child's condition had improved, the wound discharging freely and granulating. On October 2, 1924, a swelling in the left thigh had appeared. This had progressed slowly and had been opened on November 2, 1924. In December, 1925, the child had been reported as walking with a limp of the right leg. X ray examination of the hip had revealed changes in the head of the right femur typical of Perthes's disease. The general condition had improved and, the wounds being healthy, the child had been discharged on January 10, 1925.

Lupus Erythematosus.

DR. A. J. P. CHAPMAN showed a girl, aged five years. The parents had noticed a red patch on the child's right cheek when she was about two years of age and this patch had always appeared to be worse in the summer months. There were three other children in the family and all were well. Dr. Chapman pointed out that there was a reddish erythematous patch on each cheek slightly infiltrated and with very little crust formation. Small areas of cicatricial atrophy could be seen studded through the patch on the right cheek. The chest was clear. No septic focus was present in the ear or nose. The health was otherwise excellent and there was no history of exanthemata.

Skiagrams.

DR. H. R. SEAR showed some interesting skiagrams and the conditions illustrated included marble disease of bone and sarcomatosis.

Pathological Specimens.

DR. F. TIDSWELL gave an interesting demonstration of pathological specimens.

JOSEPH BANCROFT MEMORIAL LECTURE.

THE Council of the Queensland Branch of the British Medical Association has instituted a Joseph Bancroft Memorial Lecture in honour of the discoverer of the filarial parasite. The lecture will be an annual fixture, it will be delivered by invitation in August at the time of the Post-Graduate Course in Brisbane. A medal is being struck for presentation to the lecturer.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Bateman, John Edwin, M.B., 1913, Ch.M., 1915 (Univ. Sydney), Burlington Road, Homebush.
Buddee, Frederick William, M.B., Ch.M., 1925 (Univ. Sydney), 27, Harbour Street, Mosman.
Foley, Horace John, M.B., 1926 (Univ. Sydney), 2, Moseley Street, Strathfield.
Freeborn, Wallace, M.B., Ch.M., 1923 (Univ. Sydney), Elsie Street, Homebush.
Harlock, Lachlan Alexander, M.B., Ch.M., 1924 (Univ. Sydney), 19, Woniora Road, Hurstville.
Hart, Albert Hughie, M.B., Ch.M., 1925 (Univ. Sydney), Wentworth Street, Parramatta.
Hayes, Geoffrey Stanhope Sautelle, M.B., Ch.M., 1926 (Univ. Sydney), Wentworth Road, Vaucluse.
Hull, Eric Douglas, M.B., Ch.M., 1926 (Univ. Sydney), 6, "Buena Vista," Clifton Gardens, Mosman.
MacMahon, John Stephen, M.B., Ch.M., 1926 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.
Norton, Cecil Hugh, M.B., Ch.M., 1925 (Univ. Sydney), Holbrook.
Spencer, William Morton, M.B., Ch.M., 1926 (Univ. Sydney), Springdale Road, Killara.
Tooth, Frederick, M.R.C.S., 1914 (England), L.R.C.P., 1914 (London), Lane Cove Road, Gore Hill.
Winning, Kathleen Margaret, M.B., Ch.M., 1926 (Univ. Sydney), 25, Carr Street, Coogee.

THE undermentioned have been elected members of the Victorian Branch of the British Medical Association:

McTeigue, Charles Joseph, M.B., B.S., 1925 (Univ. Melbourne), Bluff Road, Black Rock.
Donaldson, William Edward, M.B., B.S., 1925 (Univ. Melbourne), Austin Hospital.

Medical Societies.

THE MELBOURNE PÆDIATRIC SOCIETY.

THE TWENTIETH ANNUAL MEETING OF THE MELBOURNE PÆDIATRIC SOCIETY was held at Cockerton's Café, Melbourne, on April 14, 1926, DR. LIONEL HOOD, the President, in the chair.

Financial Statement.

The financial statement was presented by DR. A. B. MCCUTCHEON, the Honorary Treasurer, and adopted.

Annual Report.

The annual report which was next read, was as follows: The membership of the Society has now increased to eighty. During the year eight meetings were held and the majority were very well attended, especially by junior members of the Staff. Several most interesting and instructive papers were read by the following:

PROFESSOR BERRY: "Physical and Mental Testing";
DR. REGINALD WEBSTER and MISS WILLIAMS: "Bacillary Dysentery in Children";
DR. H. DOUGLAS STEPHENS and DR. REGINALD WEBSTER: "Anterior Poliomyelitis,"

to all of whom the best thanks of the Society are due, also to Dr. Kent Hughes for his excellent demonstration of the "End-Results in Orthopædics" and to Drs. Penfold, Graham, Downes, Derham, Stephens and Webster and Hewlett for their contributions to the discussion on "Glandular Tuberculosis."

The conjoint meeting with the Victorian Branch of the British Medical Association which was attended by the Post-Graduate Class, was most successful and an extremely interesting series of patients was demonstrated. The success of our meetings during the year was due largely to the able administration of Dr. Southby and Dr. Hylton and our thanks are especially due to them for the manner in which they have reported the proceedings of the Society to THE MEDICAL JOURNAL OF AUSTRALIA.

The Honorary Secretaries would be pleased to receive suggestions for future meetings and ask for the wholehearted cooperation of all members of the Society during 1926.

Election of Office Bearers.

The following office bearsrs were then elected for the ensuing year:

President: Dr. A. P. Derham.
Honorary Treasurer: Dr. A. B. McCutcheon.
Honorary Secretary: Dr. J. W. Grieve.
Assistant Honorary Secretary: Dr. R. Hylton.
Honorary Auditor: Dr. W. W. McLaren.
Members of Committee: Dr. Rupert Downes, Dr. H. Boyd Graham, Dr. H. Douglas Stephens, Dr. W. G. D. Upjohn.

Votes of Thanks.

The meeting concluded with votes of thanks to the Committee and to the Matron and Nursing Staff of the Children's Hospital.

Dinner.

After the formal business had been disposed of, the incoming President, Dr. A. P. Derham, was welcomed to the chair and the Society entertained at dinner Professor Peter MacCallum, Professor of Pathology of the University of Melbourne.

In responding to the toast of his health which had been proposed by Mr. Hamilton Russell and supported by Dr. Douglas Stephens and Dr. Reginald Webster, Professor MacCallum thanked the Society for honouring him as the guest of the evening. He emphasized the importance of the cooperation between the clinical and the academic aspects of the teaching and the practice of medicine. The curriculum, he said, should be made for the student and aim at fostering and advancing his highest ambitions and not the student made to fit a certain curriculum.

Professor MacCallum also spoke of the importance of research work in medicine generally and in diseases of children in particular and emphasized the fact that each hospital should have its own research institute in addition to the laboratory which had to deal with the routine service work of the hospital.

In conclusion, Professor MacCallum mentioned that Dr. Reginald Webster had recently been awarded the degree of Doctor of Science and members took the opportunity of congratulating him on the honour which the University had conferred upon him for research work in diseases of children.

Public Health.

THE HEALTH CONDITIONS OF THE COOK ISLANDERS.

SINCE the International Health Board of the Rockefeller Foundation completed its work in collaboration with the Government of Australia and those of the Australian States, it has undertaken some important investigations in the Pacific. Invitations have been issued by the authorities controlling many of the islands to the Board to carry out health surveys, more particularly with reference to the incidence of hookworm infection. In response to the invitations the Board commissioned Dr. S. M. Lambert to institute the campaigns. He has issued several interesting reports. About a year ago arrangements were made for a health survey of the Cook Islands. Dr. Lambert accompanied by a Fijian native medical practitioner named Malakai Veisamasama started the survey on November 15, 1925. They restricted their attention to the Lower Cook Islands and carried out investigations in Raratonga, Mangaia, Aitutaki, Mauke, Mitiaro, Atiu and Manuae, leaving the northern group untouched.

It may be mentioned that for some time there has existed in Fiji a medical school for native students. At this school the students are given sufficient training in medicine and medical practice to render them competent practitioners. A movement is now under consideration for the enlargement of this medical school for natives to cover the needs of all the islands in the South Pacific Ocean under British control. The authorities of Fiji, Tonga, the Gilbert and Ellice Islands, the British Solomon Islands, Samoa, the New Hebrides and the Cook Islands have given favourable consideration to the proposal; whether the Australian Government, as suzerain of Papua and New Guinea, will collaborate or not is uncertain. It is claimed that the native medical practitioners can achieve much more than any European medical practitioner in checking the decline of the native races, because of his understanding of the psychology and languages of the native communities and because of the greater ease with which he can approach them. The training, although superficial from the standards of modern medicine, is a good one, eminently practical and sufficient for the present needs of the native population. Malakai, Dr. Lambert's assistant, is a highly skilled microscopist, a competent diagnostician and a thoroughly reliable practitioner.

Dr. Lambert has issued his report on the survey of the Cook Islands.[1] The report makes good reading. He gives an accurate and interesting brief history of the islands in order that the problems involved in his investigation may be better understood.

The Cook Islander is a Polynesian, with copper coloured skin, straight hair and Caucasian-like features. According to the local traditions the race has a dual ancestry. A Samoan warrior named Karika is supposed to have been on a voyage of discovery when he met a Tahitian named Tangiia on a similar mission. Instead of engaging in battle which would have been the natural outcome of such a meeting at sea, they agreed to join forces, because as Tangiia pointed out the victor would not obtain credit on his return after an unwitnessed encounter. They discovered Rarotonga, the largest of the Cook Islands and divided it in two parts. From this island they gradually spread on to the other islands of the group. It is stated that the ancestry of the present generation can still be traced. The population of the whole group is said to be about ten thousand. It is certainly less than it was before the advent of the white man. It appears that the intervention of so-called civilization began when the London Missionary Society's representatives arrived and continued with the arrival of a British agent appointed by the New Zealand Government. The inevitable result followed. The wild tribes whose behaviour was governed by their own moral code, were persuaded to adopt the conventions of the West. The white man gave them many presents, Christianity, a taste for alcohol, commercial cunning, disease and false modesty. The white man is now attempting to stay the ravage, but he is unwilling to withdraw the influences which led to it. Indeed, it is doubtful whether these influences could now be nullified.

The medical care of the population is under the control of the Chief Medical Officer and the Assistant Medical Officer. There is a hospital at Avarua, Rarotonga, with a white matron. The Assistant Medical Officer visits the islands of the group from time to time. There are white nurses at Aitutaki and Mangaia.

The water supply of Avarua is from a reservoir and Dr. Lambert says that it is good. In other places water is collected in tanks. The natives drink the water from young cocoanuts. Shallow pit privies are found on many of the islands. In Avarua there are a few septic tanks and some latrines. The Commissioner has promised to institute a system of properly constructed latrines to lessen the risk of serious outbreaks of intestinal infections.

Some figures are quoted in connexion with the vital statistics. The total number of births has increased from 287 in 1919 to 325 in 1925, while the total number of deaths has increased from 185 in 1919 to 219 in 1925. It is said that the birth rate is thirty-two and the death rate twenty-four. It appears to us that little reliance can be placed on these figures. From the figures supplied the infantile death rate works out at 187·2 per thousand births.

From the investigations of others and their own observations Dr. Lambert has indicated the nature of the diseases prevalent in the Cook Islands. Morbilli has occurred and is usually fatal. There is no enteric fever among the natives. Dysentery is common, while tetanus is by no means rare. Rheumatism is frequently seen. There is some tuberculosis. Yaws is a very common disease, while syphilis and gonorrhœa are apparently infrequent among the natives. Filariasis of the aperiodic type abounds. In this connexion Dr. Lambert points out that the *Stegomyia pseudoscutellaris* is very prevalent. Elephantiasis is encountered in consequence in the Cook Islands as in many other Pacific islands. One native is known to be infected with leprosy. The hospital records reveal the usual list of diseases, but since there are four beds for Europeans, the figures do not assist us in ascertaining the incidence of the several diseases among the natives.

The hookworm survey was carried out in the usual manner. It appears that the stools of 1,003 natives were examined and it was determined that 711 were infected, which yields an infection rate of 70%. Of twenty-three Europeans examined, thirteen or 56% were found to be infected. The heaviest infection was in Mangaia, the most southern island of the group. Of those examined 458 were adults and 565 children. The incidence among the former is 74% and among the latter 68%. Dr. Lambert points out that the infection rate in the males and females and in the adults and children varies considerably in the different islands. While the infection is commoner among males than among females in the whole group, more girls are infected than boys in Mangaia, Mauke, Mitiaro and Atiu; more women are infected than men in Rarotonga, Mitiaro and Atiu. A few worm counts were made in order to discover the severity of the infection. In all counts were undertaken in the case of twenty-three natives. It was, however, impossible to complete the investigations after treatment in sixteen of these persons. In the remaining seven some heavy infections were encountered. A mixture of chenopodium and carbon tetrachloride was given, followed by a dose of saturated magnesium sulphate solution. All the seven natives were cured by the first treatment. The hookworms in all instances were *Necator americanus*.

Of the other intestinal parasites ascarides proved to be the most formidable among the natives. A high infestation with *Trichuris trichura* was noted.

[1] "Health Survey of the Cook Islands," by Dr. S. M. Lambert: Special Report, 1926.

THE MEDICAL DIRECTORY.

CIRCULARS containing forms to be filled in for the compilation of the Medical Directory have been addressed to every medical practitioner in Australasia. Those who

did not reply to the first invitation, received a second circular. There are still many who have not entered the details required on the forms and returned them to The Printing House, Seamer Street, Glebe, New South Wales. The form has been reproduced in this issue and will be found in the Advertiser. Members who have not already sent in their forms, are earnestly requested to tear out the page, to fill in the necessary details and to transmit it to this address as soon as possible.

THE PICTON LAKES VILLAGE FOR CONSUMPTIVES.

WE have been asked to announce that a ball is to be held at the Palais Royal, Sydney, in aid of a movement known as the Picton Lakes Village. This is an organization for the settlement of sufferers from pulmonary tuberculosis who have undergone treatment and who have recovered sufficiently to enable them to earn their living under favourable conditions and in a favourable environment. The movement is supported by a large and influential committee under the patronage of His Excellency Admiral Sir Dudley de Chair, Governor of New South Wales.

The ball will be held on June 8, 1926. Tickets can be obtained from the Campaign Rooms, 4, Bridge Street, Sydney, or from the usual agents. It is anticipated that the entertainment will be a brilliant spectacle and the support of the medical profession in New South Wales should be considerable, in view of the worthy object in view.

Naval and Military.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette* Numbers 38, 41 and 43, of April 29, May 6 and 13, 1926.

PERMANENT NAVAL FORCES OF THE COMMONWEALTH (SEA-GOING FORCES).

Francis Joseph Matthews, M.B., B.S., and Robert Nihill, M.B., Ch.M., are appointed Surgeon-Lieutenants (on probation), dated 12th March, 1926.

Surgeon-Commander Ivor Stanley Gabe is appointed on loan from the Royal Navy (Exchange Officer), with seniority in rank of 11th April, 1925, dated 11th March, 1926.

AUSTRALIAN MILITARY FORCES.

First Military District.

Australian Army Medical Corps.

Captain N. M. Gutteridge is transferred from the Australian Army Medical Corps, 3rd Military District, 24th February, 1926.

Australian Army Medical Corps Reserve.

Honorary Captain N. A. A. Trenow is retired under the provisions of Australian Military Regulation 152 (1), 19th April, 1926.

Second Military District.

First Division—Staff.

Lieutenant-Colonel (Temporary Colonel) A. H. Tebbutt, D.S.O., from the appointment of Assistant Director of Medical Services, 1st Cavalry Division, is appointed Assistant Director of Medical Services, Divisional Headquarters, with retention of the temporary rank of Colonel, 1st January, 1926, *vice* Colonel E. S. Stokes, who relinquishes the appointment on 31st December, 1925.

Australian Army Medical Corps.

Colonel E. S. Stokes is transferred to the Australian Army Medical Corps Reserve, 1st January, 1926.

To be Lieutenant (provisionally).—George Frederick Lumley, 20th April, 1926.

Major N. E. B. Kirkwood, M.C., is brought on the authorized establishment of Majors, 16th February, 1926.

Australian Army Medical Corps Reserve.

Lieutenant K. P. Rutherford is transferred from the General List of the Reserve of Officers, and to be Honorary Captain, 19th March, 1926.

Honorary Captain J. McVittie is transferred from the Australian Army Medical Corps Reserve, 4th Military District, 20th April, 1926.

Captain F. M. Purchas is placed upon the Retired List with permission to retain his rank and wear the prescribed uniform, 25th April, 1926.

Honorary Captain G. Allan is retired under the provisions of Australian Military Regulation 152 (1), 22nd April, 1926.

The resignation of Captain J. K. Patrick of his commission is accepted, 19th April, 1926.

Liteutenant T. E. Y. Holcombe is transferred from the General List of the Reserve of Officers, and to be Honorary Captain, 15th April, 1926.

Third Military District.

Australian Army Medical Corps.

Captain N. M. Gutteridge is transferred to the Australian Army Medical Corps, 1st Military District, 24th February, 1926.

Australian Army Medical Corps Reserve.

Captain J. H. Leon and Honorary Captain P. Matenson are transferred from the Australian Army Medical Corps Reserve, 4th Military District, 20th April, 1926.

Fourth Military District.

Australian Army Medical Corps Reserve.

Honorary Captain J. McVittie is transferred to the Australian Army Medical Corps Reserve, 2nd Military District, 20th April, 1926.

Captain J. H. Leon and Honorary Captain P. Matenson are transferred to the Australian Army Medical Corps Reserve, 3rd Military District, 20th April, 1926.

Correspondence.

DENGUE FEVER IN QUEENSLAND.

SIR: Southern Queensland and Northern New South Wales have for some months been suffering from the ravages of a widespread epidemic of dengue fever. This has been responsible for an enormous dislocation of business and a corresponding loss of wages.

To those of us who are endeavouring to eradicate the mosquito in our midst, it is somewhat disconcerting to find the carrier described by names which differ from the commonly used ones. These names, due to alternative classifications, are to be found in more or less inspired articles which have appeared from time to time in the daily press.

Owing to the efforts made in Toowoomba some years ago, when a successful campaign was carried out against the day biting "tank" mosquito, the name *Stegomyia fasciata* became almost a household word in Southern Queensland. This name was used for the carrier of dengue. Suspicion that the knowledge of enthusiasts is sadly lacking is aroused in the minds of sceptics when it is stated in articles in the Sydney papers that the only proved carrier is *Ædes ægypti*.

Again, statements vary as to the breeding places. It has been generally accepted that *Stegomyia fasciata* is found

invariably to choose clean water for oviposition, such as is to be found in rain water tanks, cisterns, water jugs and suchlike articles about houses. I read recently that *Ædes ægypti* had been located by a certain investigator in the polluted water of the outside tank of an acetylene gas plant.

Under whatever name he goes, the insect is reported as a poor traveller, seldom leaving the breeding places. The ova are strongly resistant to cold and are reputed to retain their vitality in a desiccated condition for several months. In many places there has been an almost complete absence of rain for some months, yet *Stegomyia fasciata* is to be found in great numbers. This argues that the mosquito has adapted itself to altered conditions and is not now as fussy as it used to be. In this respect it would appear that some revision of our knowledge is necessary.

Stegomyia fasciata (*Ædes ægypti*, Linn.) is a somewhat noisy insect and very elusive. As opposed to this, a mosquito may be found here, of about the same size, brownish in colour, with banded legs and abdomen, resembling a cross between *Culex fatigans* and *Ædes ægypti*. It is a silent worker, being very persistent and vicious, resembling in this respect *Ædes notoscriptus*. Owing to its prevalence one cannot help regarding it with suspicion. Possibly it is a variant of *Ædes ægypti* due to altered breeding conditions and subsequent early life history.

However, my object in writing is not to air my own views on the subject, but to point out that the public is clamoring for more work to be done in this field, in order that devastating epidemics such as the present one may be prevented in future. It is useless to say, "Eliminate all mosquitoes"; such an undertaking involves a cost which is quite beyond the powers of many communities. But the destruction of certain varieties of mosquitoes is simple and should be universally enforced.

An authoritative statement, covering all the known facts and over the signatures of acknowledged experts, would, if widely broadcast, prove an inestimable boon to those working for the control of the menace. On the other hand, by providing arguments, however wrong, for the use of sceptics and obstructionists the publication of futile paragraphs in the daily press serves only to hamper the effort.

There is a very wide field for investigation and the suffering of say one hundred and fifty thousand people should be sufficient inducement to some capable and enthusiastic workers to get busy and the location of the causal organism of dengue should not remain long undiscovered.

Yours, etc.,

JOHN S. SMYTH.

Warwick, Queensland.
April 20, 1926.

A WARNING.

SIR: With reference to the letter in THE MEDICAL JOURNAL OF AUSTRALIA of the eighth instant, under the heading of "A Warning," I am led to wonder if the preparation referred to by the writer included a hypodermic injection of morphia. During the past five years it has been my practice in cases of obstructed or strangulated hernia to give such adult patients, if seen early, a hypodermic injection of morphia grain one-half and to raise the foot of the bed.

In four cases out of the five that I have seen during that period, on returning after an absence of from two to three hours I found the patient asleep and the hernia spontaneously reduced. The cases in which the procedure was successful were all inguinal herniæ and all subsequently submitted to the operation for radical cure. One case was a child of two years who received an injection of morphia grain one-twelfth. The case which did not reduce spontaneously was a man, *ætatis* sixty-five years, who travelled a distance of thirty-two miles with a median ventral hernia that had been obstructed for some hours.

I learned the above plan of treatment from my former partner, Dr. John Johnson, of this town, but now retired from practice. He tells me that both he and the late Dr. C. C. McDonald were in the habit of employing this treatment for many years.

Yours, etc.,

RENFREY G. BURNARD, M.B., B.S.

Mount Gambier, South Australia,
May 12, 1926.

Proceedings of the Australian Medical Boards.

NEW SOUTH WALES.

THE undermentioned have been registered under the provisions of the *Medical Act*, 1912 and 1915, as duly qualified medical practitioners:

Miles, Thomas William, M.B., Ch.M., 1926 (Univ. Sydney), Fairfield.

Moir, Alistair Edward Martin, M.B., Ch.M., 1926 (Univ. Sydney), Astonville, Helena Street, Leichhardt.

O'Donoghue, Francis Martin, M.B., 1926 (Univ. Sydney), 212, Glebe Road, Glebe Point.

O'Hanlon, Kevin Charles, M.B., Ch.M., 1926 (Univ. Sydney), Karabar, Queanbeyan.

Perkins, Roy, M.B., Ch.M., 1926 (Univ. Sydney), Studleigh, Ocean Beach, Manly.

Perry, Edward Fair, M.B., Ch.M., 1926 (Univ. Sydney), Kokera, Wigram Street, Harris Park.

Playoust, Gabrielle Blanche, M.B., Ch.M., 1926 (Univ. Sydney), Woodside, Boulevarde, Strathfield.

Power, Thomas Felix Washington, M.B. Ch.M., 1926 (Univ. Sydney), Monaise, Bowen Terrace, Brisbane, Queensland.

Price, Alexander Vivian Gordon, M.B., 1926 (Univ. Sydney), c.o. J. Morgan, Esq., 113, Napier Street, Drummoyne.

Quayle, Athol Frederic, M.B., Ch.M., 1926 (Univ. Sydney), Old Canterbury Road, Summer Hill.

Rawle, Glanville Jeffries, M.B., Ch.M., 1926 (Univ. Sydney), 83, Kingston Street, Haberfield.

Rawle, Kenneth Charles Trineman, M.B., Ch.M., 1926 (Univ. Sydney), Lyndhurst, Wentworth Street, Blackheath.

Roberts, Frederick Gregory, M.B., Ch.M., 1926 (Univ. Sydney), Mifelni, Fuller's Road, Chatswood.

Rock, Harry Owen, M.B., 1926 (Univ. Sydney), Bedford, 2, Homebush Road, Homebush.

Ross, David Mitchell, M.B., Ch.M., 1926 (Univ. Sydney), Banksmeadow, Botany.

Russell, John Donald, M.B., Ch.M., 1926 (Univ. Sydney), 407, Kent Street, Sydney.

Sandrey, John Gordon, M.B., Ch.M., 1926 (Univ. Sydney), 182, Beach Street, Coogee.

Shallard, Bruce Thomas, M.B., Ch.M., 1926 (Univ. Sydney), 63, Ocean Street, Bondi.

Sillar, Keith Irving, M.B., Ch.M., 1926 (Univ. Sydney), 45, Reynolds Street, Neutral Bay.

Sim, Cecil Rhodes, M.B., Ch.M., 1926 (Univ. Sydney), Epson, 41, Boronia Road, Bellevue Hill.

Sippe, Clive Henry, M.B., Ch.M., 1926 (Univ. Sydney), Brooklyn, Nelson Road, Lindfield.

Smith, Kenneth Stokes, M.B., Ch.M., 1926 (Univ. Sydney), 264, Bondi Road, Bondi.

Spedding, Ronald Louis, M.B., 1926 (Univ. Sydney), 22, Cowper Street, Randwick.

Spencer, William Morton, M.B., Ch.M., 1926 (Univ. Sydney), Valetto, Springdale Road, Killara.

Staples, Eric Hope, M.B., Ch.M., 1926 (Univ. Sydney), Mount Royal, Bundarra Road, Bellevue Hill.

Steigrad, Joseph, M.B., Ch.M., 1926 (Univ. Sydney), Clarinda, Mundarrah Street, Clovelly.

Street, Jack Blakely, M.B., Ch.M., 1926 (Univ. Sydney), c.o. Mr. W. H. Stuart, Merrimu, Gordon Road, Chatswood.
Symington, Norman John, M.B., Ch.M., 1926 (Univ. Sydney), Broxbourne, 315, Mowbray Road, Chatswood.
Vickers, Allan Robert Stanley, M.B., Ch.M., 1926 (Univ. Sydney), 364, Tribune Street, Albury.
Voss, Florence Mary, M.B., Ch.M., 1926 (Univ. Sydney), 15, Wolseley Road, Point Piper.
Walker, Addie, M.B., Ch.M., 1926 (Univ. Sydney), Eastbourne, Balfour Road, Rose Bay.
Wharton, Joyce Helen Wentworth, M.B., Ch.M., 1926 (Univ. Sydney), Ettalong Beach.
Wilcox, Rita, M.B., Ch.M., 1926 (Univ. Sydney), Grantham, Potts Point.
Wilson, Gerald Barry, M.B., Ch.M., 1926 (Univ. Sydney), The Hermitage, Orange.
Wilson, Milford Graham, M.B., Ch.M., 1926 (Univ. Sydney), Loombra, Armidale.
Winning, Kathleen Margaret, M.B., Ch.M., 1926 (Univ. Sydney), 25, Carr Street, Coogee.
Woodland, Leslie James, M.B., Ch.M., 1926 (Univ. Sydney), 82, Susan Street, Randwick.
Worrall, Ralph Lyndal, M.B., Ch.M., 1926 (Univ. Sydney), Ideraway, Birkley Place, Elizabeth Bay.

Medical Appointments.

Dr. C. V. Hallett (B.M.A.) has been appointed Quarantine Officer, Thevenard, South Australia.

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Dr. F. R. D. Glissan has been appointed District Medical Officer and Public Vaccinator at Tambellup, Western Australia.

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Dr. Ernest Joseph Burton has been appointed Government Medical Officer at Port Douglas, Queensland.

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Dr. Joseph Ernest O'Sullivan has been appointed Government Medical Officer at Collinsville, Queensland.

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Dr. Michael Leonard Devaney McKeon (B.M.A.) has been appointed Acting Government Medical Officer at Bundaberg, Queensland.

Books Received.

INVALID DIET: DIRECTIONS AND RECIPES: A SPECIAL DIET RECIPE BOOK, by Dorothy Morton, with a Foreword by J. Johnston Abraham, C.B.E., D.S.O., M.A., M.D. (Dublin), F.R.C.S. (England); 1926. London: William Heinemann (Medical Books) Limited. Post 8vo., pp. 108. Price: 5s. net.

CATECHISM SERIES: PHYSIOLOGY, Fourth Edition, Part II.; 1926. Edinburgh: E. and S. Livingstone. Crown 8vo., pp. 80. Price: 1s. 6d. net.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xx.

ALFRED HOSPITAL, MELBOURNE: Medical Superintendent.
NEW SOUTH WALES GOVERNMENT RAILWAYS AND TRAMWAYS: Two Assistant Medical Officers (Male).
RENWICK HOSPITAL FOR INFANTS, SUMMER HILL (THE BENEVOLENT SOCIETY OF NEW SOUTH WALES): Honorary Ear, Nose and Throat Surgeon.
ROYAL HOSPITAL FOR WOMEN, PADDINGTON (THE BENEVOLENT SOCIETY OF NEW SOUTH WALES): Resident Medical Officer, Junior Resident Medical Officer.
ROYAL PRINCE ALFRED HOSPITAL: Honorary Medical Staff.
SYDNEY HOSPITAL: Honorary Psychiatrist in Charge of the Psychiatric Clinic.
SYDNEY HOSPITAL: Three Clinical Assistants.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester United Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association.
QUEENSLAND: Honorary Secretary B.M.A. Building, Adelaide Street, Brisbane.	Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Honorary Secretary, 12, North Terrace, Adelaide.	Contract Practice Appointments at Ceduna, Wudinna (Central Eyre's Peninsula), Murat Bay and other West Coast of South Australia Districts.
WESTERN AUSTRALIAN: Honorary Secretary, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Diary for the Month.

JUNE 1.—Tasmanian Branch, B.M.A.: Council.
JUNE 2.—Victorian Branch, B.M.A.: Branch.
JUNE 2.—Western Australian Branch, B.M.A.: Council.
JUNE 3.—South Australian Branch, B.M.A.: Council.
JUNE 3.—Section of Orthopædics, New South Wales.
JUNE 4.—Queensland Branch, B.M.A.: Branch.
JUNE 8.—Tasmanian Branch, B.M.A.: Branch.
JUNE 8.—New South Wales Branch, B.M.A.: Ethics Committee.
JUNE 8.—Section of Medicine, New South Wales.
JUNE 10.—New South Wales Branch, B.M.A.: Clinical Meeting.
JUNE 11.—Queensland Branch, B.M.A.: Council.
JUNE 15.—Tasmanian Branch, B.M.A.: Council.
JUNE 15.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JUNE 16.—Western Australian Branch, B.M.A.: Branch.
JUNE 16.—Victorian Branch, B.M.A.: Council.
JUNE 16.—Central Northern Medical Association, New South Wales.
JUNE 16.—South Sydney Medical Association, New South Wales.
JUNE 16.—Section of Obstetrics and Gynæcology, New South Wales.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad *per annum* payable in advance.